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by increasing the permanence of its operation as a general stimulant, or more particularly as a diaphoretic.

These are very elegant and efficacious tinctures; the volatile spirit excellently dissolving the gum, and at the same time promoting its medicinal virtue. In rheumatic cases, a tea or even table spoonful, taken every morning and evening in any convenient vehicle, particularly in milk, has proved of singular service.

Tincture of black hellebore. L.

- 449 Take of black hellebore root, in coarse powder, four ounces; cochineal, powdered, two scruples; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain.

Tincture of melampodium, or black hellebore. E.

Take of black hellebore root, four ounces; cochineal, half a dram; proof-spirit, two pounds and a half. Digest them together for eight days, and afterwards filter the tincture through paper.

This is perhaps the best preparation of hellebore, when designed for an alterative, the menstruum here employed extracting the whole of its virtues. It has been found, from experience, particularly serviceable in uterine obstructions; in sanguine constitutions, where chalybeates are hurtful, it has been said that it seldom fails of exciting the menstrual evacuations, and removing the ill consequences of their suppression. So great, according to some, is the power of this medicine, that wherever, from an ill conformation of the parts, or other causes, the expected discharge does not succeed on the use of it, the blood, as Dr Mead has observed, is so forcibly propelled, as to make its way through other passages. A tea spoonful of the tincture may be taken twice in a day in warm water or any other convenient vehicle.

The college of Edinburgh had formerly a tincture of this root with wine. Proof spirit is undoubtedly preferable, both as a menstruum, and as being better fitted for keeping.

Tincture of jalap.

- 450 Take of powdered jalap root, eight ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain. *L.*

Take of jalap, in coarse powder, three ounces; proof-spirit, fifteen ounces. Digest them for eight days, and strain the tincture. *E.*

Rectified spirit of wine was formerly ordered for the preparation of this tincture; but rectified spirit dissolving little more than the pure resinous parts of the jalap, rendered the use of the medicine somewhat less commodious than that of the tincture prepared with proof-spirit. Most of the tinctures made in rectified spirit, diluted with water, so as to be fit for taking, form a turbid white mixture. Many of them are safely taken in this form, without any further addition: but the cathartic ones are never to be ventured on without an admixture of syrup or mucilage to keep the resin united with the liquor; for if it separates in its pure undivided state, it never fails to produce violent gripes.

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Some have preferred to the tinctures of jalap, a solution in spirit of wine of a known quantity of the resin extracted from the root; and observe, that this solution is more certain in strength than any tincture that can be drawn from the root directly. For, as the purgative virtue of jalap resides in its resin, and as all jalap appears from experiment not to be equally resinous, some sorts yielding five, and others not three, ounces of resin from sixteen; it follows, that although the root be always taken in the same proportion to the menstruum, and the menstruum always exactly of the same strength, it may, nevertheless, according to the degree of goodness of the jalap, be impregnated with different quantities of resin, and consequently prove different in degree of efficacy. Though this objection against the tincture does not reach so far as some seem to suppose, it certainly behoves the apothecary to be careful in the choice of the root. The inferior sorts may be employed for making resin of jalap, which they yield in as great perfection, though not in so large quantity, as the best. Neumann thinks even the worm-eaten jalap as good for that purpose as any other.

Tincture of gum-kino. E.

Take of gum-kino, two ounces; proof-spirit, a pound and an half. Digest eight days, and strain.

The substance called *gum-kino* seems to be really a gum-resin; on which account proof-spirit is the most proper menstruum. This preparation must therefore possess the virtues of the substance; and it is perhaps one of the best forms under which it can be exhibited in obstinate diarrhoeas, and in cases of lenteria: but in hemorrhagies, it is in general proper to exhibit it either in substance or diffused; yet we cannot help thinking that the want of this tincture is an omission in the London pharmacopœia.

Compound tincture of lavender. L.

Take of spirit of lavender, three pints; rosemary, one pint; cinnamon bruised, nutmegs bruised, of each half an ounce; red saunders, one ounce. Digest for ten days, and strain.

Compound spirit of lavender. E.

Take of simple spirit of lavender, three pounds; simple spirit of rosemary, one pound; cinnamon, one ounce; cloves, two drams; nutmeg, half an ounce; red saunders, three drams. Macerate seven days, and strain.

These two compositions, although varying a little from each other, both with respect to their ingredients and names, may yet be considered as precisely the same. Although the London college, in the present edition of their pharmacopœia, have made many useful alterations with respect to names, yet the propriety of the change here adopted may perhaps be doubted: For it cannot with justice be styled a tincture of lavender, when the distilled spirit of that plant is employed only as a menstruum. If, therefore, it seemed necessary to refer it to the head of tinctures, it ought to have been denominated from the cinnamon or nutmegs; but since the activity of this article very much depends on the spirit of lavender,

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vender, the old name is in our opinion justly preferable to the new one.

The red saunders is of no farther use in these compositions than as a colouring ingredient. If a yellow spirit was liked, the yellow saunders would be an excellent article, as it not only communicates a fine colour, but likewise a considerable share of medicinal virtue. A spirit distilled from the flowers of lavender and sage, in due proportion, and digested in the cold for a little time with some cinnamon, nutmegs, and yellow saunders, proves a very elegant and grateful one. Where essential oils are employed, particular care must be had in the choice of them; for on their goodness that of the medicine depends. The digestion of the spirit with the spices, &c. should be performed without heat, otherwise the flavour of the medicine will be injured. These spirits are grateful reviving cordials: though considerably more simple, they are not less elegant or valuable than many other more elaborate preparations. This medicine has long been held in great esteem, under the name of *Palsy drops*, in all kinds of languors, weakness of the nerves, and decays of age. It may be conveniently taken on sugar, from ten to eighty or a hundred drops.

Tincture of musk. E.

453. Take of musk, two drams; rectified spirit of wine, one pound. Digest for ten days, and strain.

Rectified spirit is the most complete menstruum for musk; but in this form it is often impossible to give such a quantity of the musk as is necessary for our purpose; and hence this article is more frequently employed under the form of julep or bolus.

Tincture of myrrh.

454. Take of myrrh, bruised, three ounces; proof-spirit, a pint and an half; rectified spirit of wine, half a pint. Digest with a gentle heat for eight days, and strain. L.

Take of myrrh, three ounces; proof-spirit, two pounds and a half. After digestion for ten days, strain off the tincture. E.

The pharmaceutical writers in general have been of opinion, that no good tincture can be drawn from myrrh by spirit of wine alone, without the assistance of fixed alkaline salts. But it appears from proper experiments, that these salts only heighten the colour of the tincture, without enabling the menstruum to dissolve any more than it would by itself. Rectified spirit extracts, without any addition, all that part of the myrrh in which its peculiar smell and taste reside, viz. the resin: and proof-spirit dissolves almost the whole of the drug, except its impurities: hence the combination of these two directed by the London college is perhaps preferable to either by itself.

Tincture of myrrh is recommended internally for warming the habit, attenuating viscid juices, strengthening the solids, opening obstructions, particularly those of the uterine vessels, and resisting putrefaction. Boerhaave greatly esteems it in all languid cases proceeding from simple inactivity; in these female disorders which are occasioned by an aqueous, mucous, sluggish indisposition of the humours, and a relaxation of the vessels; in the fluor albus, and all diseases arising

from a like cause. The dose is from fifteen drops to forty or more. The medicine may doubtless be given in these cases to advantage; though with us, it is more commonly used externally for cleansing foul ulcers and promoting the exfoliation of carious bones.

Tincture of opium. L.

Take of hard purified opium, powdered, ten drams; proof-spirit, one pint. Digest for ten days, and strain.

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Tincture of opium, commonly called liquid laudanum. E.

Take of opium, two ounces; spirituous cinnamon-water, one pound and a half. Digest four days, and strain off the tincture.

These are very elegant liquid opiates, the menstruum in the last dissolves nearly the whole substance of the opium, and effectually covers its ill flavour. It were to be wished that the shops were furnished with a liquid opiate, in which the proportion of menstruum was still much larger, so as to admit of the dose being determined by weight or measure; the method by drops seeming too precarious for a medicine of so powerful a kind. The following preparation is contrived with this view.

Take of thebaic extract, half a dram; highly rectified spirit of wine, called *alcohol*, ten ounces; simple cinnamon-water, twenty ounces. Digest them together until the opium be dissolved, and then filter the solution through paper.

This preparation is apprehended to be free from all the inconveniences attending the common opiate tinctures. The menstruum dissolves the whole of the opium except the impurities, and consequently the tincture is not liable to any uncertainty in point of strength. The dose may be ascertained to the greatest exactness; one grain of opium is contained in one ounce by measure, which is equal nearly to seven drams by weight. Neither the tinctures in wine nor proof-spirit are so well adapted for keeping as could be wished: in long standing, a part of the opium is gradually thrown off from both, and consequently the tinctures become gradually weaker: the part which thus separates, amounts sometimes, it is said, to near one-fourth of the quantity of opium at first dissolved: it floats on the surface of the vinous tincture, and in the spirituous sinks to the bottom. In the preparation here recommended, it has not been observed that any separation happens.

Instead of the cinnamon-water, pure water may be employed in the mixture: and where aromatic additions are wanted, either with a medicinal intention or for covering the ill smell of the opium, any proper tincture or distilled water may be extemporaneously joined. Saffron, an addition once employed by the Edinburgh college, has been considered as a corrector of opium; but the qualities it was supposed to correct are merely imaginary; nor indeed can that article be of much importance with any intention in the small quantity that enters a dose of the tincture; a grain of opium being accompanied with only half a grain of saffron.

A preparation in some respects similar to that here recommended was introduced into the Edinburgh phar-

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pharmacopœia published in 1774, under the title of *tinctura meconii*. Each ounce of this tincture contained four grains of opium; and it was proposed that the doses of it should be measured, not by drops, but by weight: but as modern physicians are much more bold in giving opium than their predecessors, such a scrupulous accuracy in the dose is not thought at all necessary; and it is not probable that any dangerous consequence will ever arise, merely from a difference in the size of drops. This, however, might be the case, where the thebaic tincture is by accident taken for the tincture of meconium. To such mistakes, however, it was feared that the analogy of the articles, as well as the caution necessary with respect to both, might lead; and it was on many accounts safer to have but one liquid laudanum only. It is, however, much to be regretted, that the liquid laudanum of the London and Edinburgh colleges, which by the former is now styled *tinctura opii*, by the latter *tinctura thebaica*, should differ so much from each other in point of strength.

Camphorated tincture of opium. L.

- 456 Take of hard purified opium, flowers of benzoin, each one dram; camphor, two scruples; essential oil of aniseed, one dram; proof-spirit, two pints. Digest for three days.

Paregoric elixir. E.

Take of flowers of benzoin, English saffron, each three drams; opium, two drams; essential oil of aniseeds, half a dram; vinous spirit of sal ammoniac, sixteen ounces. Digest for four days in a close vessel, and strain.

These two, though differing not merely in name, may yet be considered as agreeing very nearly in their nature.

The most material differences in the last formula from the first are the substitution of the vinous spirit of sal ammoniac for the proof-spirit, and a larger proportion of opium; the vinous spirit of sal ammoniac is not only, perhaps, a more powerful menstruum, but in most instances coincides with the virtues of the preparation; but as the opium is the ingredient on which we place the principal dependence, so its proportion is increased, in order that we may give it in such a dose as that the acrimony of the menstruum shall not prove hurtful to the stomach.

The London formula is taken from Le Mort, with the omission of three unnecessary ingredients, honey, liquorice, and alkaline salt. It was originally called *elixir asthmaticum*, which name it does not ill deserve. It contributes to allay the tickling which provokes frequent coughing; and at the same time is supposed to open the breast, and give greater liberty of breathing: the opium procures (as it does by itself) a temporary relief from the symptoms; while the other ingredients tend to remove the cause, and prevent their return. It is given to children against the chincough, &c. from five drops to twenty; to adults, from twenty to an hundred. In the London formula, half an ounce by measure contains about a grain of opium; but in the Edinburgh formula the proportion of opium is larger.

Tincture of rhubarb.

Take of rhubarb, sliced, two ounces; lesser cardamom seeds, husked and bruised, half an ounce; saffron, two drams; proof-spirit, two pints. Digest for eight days, and strain. L.

Take of rhubarb, three ounces; lesser cardamom seeds, half an ounce; proof-spirit two pounds and a half. Digest for seven days, and strain. E.

Compound tincture of rhubarb. L.

Take of rhubarb sliced, two ounces; ginger powdered, saffron, each two drams; liquorice-root, bruised, half an ounce; distilled water, one pint; proof-spirit, twelve ounces. Digest for fourteen days, and strain.

Bitter tincture of rhubarb. E.

Take of rhubarb two ounces; gentian-root, half an ounce; Virginian snake-root, one dram; proof spirit, two pounds and a half. Digest for seven days, and then strain the tincture.

Sweet tincture of rhubarb. E.

It is made by adding to two pounds and a half of the strained tincture of rhubarb, four ounces of sugar-candy.

The last of these preparations is improved from the former editions. Two ounces of liquorice and one of raisins are supplied, by an increase of the sugar-candy.

All the foregoing tinctures of rhubarb are designed as stomachics and corroborants, as well as purgatives: spirituous liquors excellently extract those parts of the rhubarb in which the two first qualities reside, and the additional ingredients considerably promote their efficacy. In weakness of the stomach, indigestion, laxity of the intestines, diarrhœas, colic, and other similar complaints, these medicines are frequently of great service: the second is also, in many cases, an useful addition to the Peruvian bark, in the cure of intermittents, particularly in cachectic habits, where the viscera are obstructed; with these intentions, a spoonful or two may be taken for a dose, and occasionally repeated.

Elixir of aloes and rhubarb, commonly called sacred elixir. E.

Take of rhubarb, cut small, ten drams; sœcotorine aloes, in powder, six drams; lesser cardamom seeds, half an ounce; proof-spirit, two pounds and a half. Digest for seven days, and then strain the elixir.

This preparation is very much employed as a warming cordial purge, and for the general purposes of aloetics; with which, however, it combines the medical properties of rhubarb.

Compound tincture of savin. L.

Take of extract of savin, one ounce; tincture of castor, one pint; myrrh, half a pint. Digest till the extract of savin be dissolved, and then strain.

This preparation had a place in the last edition of our pharmacopœia, under the title of *Elixir myrrhæ compositum*.

This preparation is improved from one described in some former dispensaries under the name of *uterine elixir*. It is a medicine of great importance in uterine obstructions, and in hypochondriacal cases; though, possibly, means might be contrived of superadding more effectually the virtues of saffron to a tincture of myrrh and castor. It may be given from five drops to twenty or thirty, or more, in pennyroyal water, or any other suitable vehicle.

Tincture of squill. L.

- 460 Take of squills, fresh dried, four ounces; proof-spirit, two pints. Digest for eight days, and pour off the liquor.

For extracting the virtues of squills, the menstruum which has hitherto been almost solely employed is vinegar. There are, however, cases in which ardent spirit may be more proper; and by the menstruum here directed its virtues are fully extracted. Hence it is with propriety that the London college have introduced this form, as well as the vinegar and oxymel. But, in general, the purposes to be answered by squills may be better obtained by employing it in substance than in any other form.

Antiphthifical tincture. E.

- 461 Take of sugar of lead, an ounce and a half; vitriol of iron, one ounce; rectified spirit of wine, one pound. Let a tincture be extracted without heat.

The reducing of the salts *separately* into powder, and performing the digestion *without heat*, are very necessary circumstances: for if the ingredients be attempted to be pulverized together, they will grow soft and almost liquid; and if heat be used, scarce any tincture will be obtained.

This tincture is sometimes given in doses of twenty or thirty drops for restraining immoderate secretions, particularly the colligative sweats attending hectic fevers and phthifical disorders; whence the name *antiphthifical tincture*. It is undoubtedly a medicine of great efficacy in these cases, but too dangerous to be rashly ventured on. Some have supposed that it does not contain any of the sugar of lead; but experiments made for that purpose have shown the contrary.

We must, however, consider the above preparation as unscientific. Both the acetous and vitriolic acid have a greater attraction for iron than for lead: and though the vitriolic be capable of discharging the acetous acid, yet it makes not only in its entire state a less perfect union with lead than the acetous acid, but it is now also combined with iron, for which it has a greater attraction, and can therefore only act on the salt of lead in proportion as it is superabundant in the salt of copperas; but in proportion as the vitriolic disengages the acetous acid from the lead, the last, in its turn, will attach itself to the iron. On the whole, it is difficult to ascertain the precise nature of this preparation; it seems always, however, to contain a quantity of lead in a saline state, sufficient to expunge it from prudent practice: or, at least, if in these cases in which it has hitherto been employed, lead be thought necessary, the salt of lead may with more safety and advantage be given in its solid state, particularly when combined with opium: and it is probably on this ac-

count that the present formula has now no place in the London pharmacopœia.

Tincture of fenna. L.

- Take of fenna, one pound; caraway-seeds, bruised, one ounce and an half; lesser cardamom-seeds, husked and bruised, half an ounce; raisins, stoned, sixteen ounces; proof-spirit, one gallon. Digest for fourteen days, and strain.

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Compound tincture of fenna, commonly called Elixir of health. E.

- Take of fenna leaves, two ounces; jalap root, one ounce; coriander seeds, half an ounce; proof-spirit, two pounds and a half. Digest for seven days, and to the strained liquor add four ounces of sugarcandy.

Both these tinctures are useful carminatives and cathartics, especially to those who have accustomed themselves to the use of spirituous liquors; they oftentimes relieve flatulent complaints and colics, where the common cordials have little effect: the dose is from one to two ounces. Several preparations of this kind have been offered to the public under the name of *Daffy's elixir*: the two above are equal to any, and superior to most of them. The last in particular is a very useful addition to the castor oil, in order to take off its mawkish taste: and as coinciding with the virtues of the oil, it is therefore much preferable to brandy, shrub, and such like liquors, which otherwise are often found necessary to make the oil fit on the stomach.

Tincture of snake root.

- Take of Virginian snake-root, three ounces; proof-spirit, two pints. Digest for eight days, and strain. L.
Take of Virginian snake-root, two ounces; cochineal, one dram; proof-spirit, two pounds and a half. Digest in a gentle heat for four days, and then strain the tincture. E.

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The tincture of snake-root was in a former pharmacopœia directed to be prepared with the tincture of salt of tartar, which being now expunged, it was proposed to the college to employ rectified spirit; but as the heat of this spirit prevents the medicine from being taken in so large a dose as it might otherwise be, a weaker spirit was chosen. The tincture made in this menstruum, which extracts the whole virtues of the root, may be taken to the quantity of a spoonful or more every five or six hours; and to this extent it often operates as an useful diaphoretic.

Tincture of valerian. L.

- Take of the root of wild valerian, in coarse powder, four ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain.

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The valerian root ought to be reduced to a pretty fine powder, otherwise the spirit will not sufficiently extract its virtues. The tincture proves of a deep colour, and considerably strong of the valerian; though it has not been found to answer so well in the cure of epileptic disorders as the root in substance, exhibited in the form of powder, or bolus. The dose of the tincture is, from half a spoonful to a spoonful or more, two or three times a-day.

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tions.*Volatile tincture of valerian.*

Take of the root of wild valerian, four ounces; compound spirit of ammonia, two pints. Digest for eight days, and strain. *L.*

465 Take of wild valerian root, two ounces; vinous spirit of sal ammoniac, one pound. Macerate for six days in a close vessel, and strain. *E.*

Both the compound and vinous spirit of sal ammoniac are here excellent menstrua, and at the same time considerably promote the virtues of the valerian, which in some cases wants an assistance of this kind. The dose may be a tea-spoonful or two.

Tincture of veratrum, or white hellebore. E.

466 Take of white hellebore root, eight ounces; proof-spirit, two pounds and a half. Digest them together for ten days, and filter the tincture through paper.

This tincture is sometimes used for acuating cathartics, &c. and as an emetic in apoplectic and maniacal disorders. It may likewise be so managed as to prove a powerful alterative and deobstruent in cases where milder remedies have little effect. But a great deal of caution is requisite in its use: the dose, at first, ought to be only a few drops; if considerable, it proves violently emetic or cathartic.

Acid elixir of vitriol. E.

467 Take of rectified spirit of wine, two pounds; drop into it by little and little six ounces of vitriolic acid; digest the mixture with a very gentle heat in a close vessel for three days, and then add of cinnamon, an ounce and a half; ginger, one ounce. Digest again in a close vessel for six days, and then filter the tincture through paper placed in a glass funnel.

The intention in this process is, to obtain a tincture of aromatic vegetables, in spirit of wine, combined with a considerable proportion of vitriolic acid. When the tincture is first drawn with vinous spirit, and the acid added afterwards, the acid precipitates great part of what the spirit had before taken up: and on the other hand, when the acid is mixed with the spirit immediately before the extraction, it prevents the dissolution of all that it would have precipitated by the former way of treatment: by previously uniting the acid and the vinous spirit together by digestion, the inconvenience is somewhat lessened.

This is a valuable medicine in weakness and relaxations of the stomach and decays of constitution, particularly in those which proceed from irregularities, which are accompanied with slow febrile symptoms, or which follow the suppression of intermittents. It frequently succeeds after bitters and aromatics by themselves had availed nothing; and indeed great part of its virtues depend on the vitriolic acid; which, barely diluted with water, has, in those cases where the stomach could bear the acidity, produced happy effects.

Fuller relates (in his *Medicina Gymnastica*) that he was recovered by Mynsicht's elixir, from an extreme decay of constitution, and continual retchings to vomit. It may be given from 10 to 30 or 40 drops or more, according to the quantity of acid, twice or thrice a-day, at such times as the stomach is most

empty. It is very usefully conjoined with the bark, both as covering its disagreeable taste and coinciding with its virtues.

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This is made of the same aromatics, and in the same manner as the aromatic tincture; except that, in place of the vinous, the dulcified spirit of vitriol is employed.

This is designed for persons whose stomachs are too weak to bear the foregoing acid elixir; to the taste, it is gratefully aromatic, without any perceptible acidity. The dulcified spirit of vitriol, here directed, occasions little or no precipitation on adding it to the tincture.

A medicine of this kind was formerly in great esteem under the title of *Vigani's volatile elixir of vitriol*; the composition of which was first communicated to the public in the *Pharmacopœia reformata*. It is prepared by digesting some volatile spirits of vitriol upon a small quantity of mint leaves curiously dried, till the liquor has acquired a fine green colour. If the spirit, as it frequently does, partakes too much of the acid, this colour will not succeed: in such case, it should be rectified from a little fixed alkaline salt.

Camphorated spirit of wine. E.

Take of camphor, one ounce; rectified spirit of wine, one pound. Mix them together, that the camphor may be dissolved. It may also be made with a double, triple, &c. proportion of camphor.

This solution of camphor is employed chiefly for external uses, against rheumatic pains, paralytic numbnesses, inflammations, for discussing tumours, preventing gangrenes, or restraining their progress. It is too pungent to be exhibited internally, even when diluted, nor does the dilution succeed well; for on the admixture of aqueous liquors, the camphor gradually separates and runs together into little masses.

Hoffman, Rothen, and others, mention a camphorated spirit not subject to this inconvenience. It is prepared by grinding the camphor with somewhat more than an equal weight of fixed alkaline salt, then adding a proper quantity of proof-spirit, and drawing off one half of it by distillation. This spirit was proposed to be received into our pharmacopœias, under the title of *Spiritus camphoræ tartarizatus*. But on trial, it did not answer expectation: some of the camphor rises with the spirit in distillation, though but a small quantity; whence, mixed with a large portion of water, it does not sensibly render it turbid; but in a proper quantity, it exhibits the same appearance as the more common camphorated spirit: it did not appear, that spirit distilled from camphor, with or without the alkaline salt, differed at all in this respect.

The most convenient method of uniting camphor with aqueous liquors, for internal use, seems to be by the mediation of almonds, or of mucilages; triturated with these, it readily mingles with water into the form of an emulsion, at the same time that its pungency is considerably abated. It may also be commodiously exhibited in the form of an oily draught, expressed oils totally dissolving it.

The anodyne liniment, commonly called Anodyne balsam. E.

Take of opium, one ounce; white Castile soap, four ounces;

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ounces; camphor, two ounces; essential oil of rosemary, half an ounce; rectified spirit of wine, two pounds. Digest the opium and soap in the spirit for three days; then to the strained liquor add the camphor and oil, diligently shaking the vessel.

The several ingredients in this formula are exceedingly well suited for the purposes expressed in the title of this preparation; the anodyne balsam has accordingly been used with much success to allay pains in strained limbs, and such like topical affections.

Saponaceous balsam or liniment. E.

- 471 This is made in the same manner and of the same ingredients as the anodyne balsam, only omitting the opium.

It is intended as a simplification and improvement of what had formerly the name of *Opodeldock*, and is employed with the same intentions as the two preceding.

Tincture of antimony. Ross.

- 472 Take of antimony, in powder, half a pound; salt of tartar, one pound; rectified spirit, three pints. Mix the antimony with the salt of tartar, and inject them by little and little into a crucible placed in a strong fire. Let the mixture melt thin, and continue in this state for half an hour; after which it is to be poured out into a hot and dry iron mortar. Powder the mass while hot, put it into a heated matrass, and pour the spirit on it. Digest them together for three days, and then strain the tincture.

In this process, the alkaline salt unites with the sulphur of the antimony into a hepar; which communicates to the spirit a tincture similar to the tincture of sulphur. This antimonial tincture is supposed to contain likewise some of the reguline parts of the mineral, and is said to have sometimes provoked a puke when taken on an empty stomach, even in a small dose. It stands recommended in doses from ten to sixty drops or more, as a deobstruent, promoter of urine, and purifier of the blood. But there is probably no purpose to be answered by it, which may not be more effectually obtained by other antimonial preparations, particularly the wine of tartar of antimony.

Tincture of colocynth. Suec.

- 473 Take of colocynth, cut small, and freed from the seeds, one ounce; aniseed, one dram; proof-spirit, fourteen ounces. Macerate for three days, and strain through paper.

In this tincture we have the active purgative power of the colocynth. And although it be seldom used as a cathartic by itself, yet even in small quantity it may be advantageously employed to promote the operation of others.

Volatile tincture of copper. Gen.

- 474 Take of filings of copper, one dram; spirit of sal ammoniac, an ounce and a half. Mix them, and keep them in a vessel closely stopped, which is to be frequently agitated, till the liquor becomes of a beautiful violet colour.

In this formula the copper is brought to a saline state by means of the volatile alkali. It may therefore be considered as very analogous to the ammoniacal copper. And where recourse is had to it in practice, it is employed with the same intentions.

Tincture of quassia. Suec.

- Take of quassia, bruised, two ounces; proof-spirit, two pounds and an half. Digest for three days, and then strain through paper.

By proof-spirit the medical properties, as well as the sensible qualities of the quassia, are readily extracted. And under this form it may be advantageously employed for answering different purposes in medicine.

Tincture of lac. Suec.

- Take of gum lac, powdered, one ounce; myrrh, three drams; spirit of scurvy-grass, a pint and an half. Digest in a sand heat for three days; after which, strain off the tincture for use.

This tincture is principally employed for strengthening the gums, and in bleedings and scorbutic exulcerations of them: it may be fitted for use with these intentions, by mixing it with honey of roses, or the like. Some recommend it internally against scorbutic complaints, and as a corroborant in gleets, female weaknesses, &c. Its warmth, pungency, and manifestly astringent bitterish taste, point out its virtues in these cases to be considerable, though common practice among us has not yet received it.

Tincture of nux vomica. Ross.

- Take of nux vomica, an ounce and a half; proof-spirit, two pounds. Digest for some days, and then strain it.

The nux vomica, a very active vegetable, has of late, as we have already had occasion to observe, been introduced into practice as taken internally, for the cure of intermittents and of contagious dysentery. In these affections it may be employed under the form of tincture as well as in substance; and in this way it most readily admits of being combined with other articles, either as adjuvantia or corrigentia.

Tincture of amber. Suec.

- Take of yellow amber, powdered, one ounce; vitriolic æther, four ounces. Digest for three days in a vessel accurately closed, frequently shaking the vessel, and after this strain through paper.

The tincture of amber was formerly prepared with rectified spirit of wine: but the menstruum here directed gives a more complete solution, and forms a more elegant and active tincture. It possesses the whole virtues of the concrete; and although it has no place in our pharmacopœia, yet it is perhaps to be considered as one of the most valuable preparations of amber. It has been recommended in a variety of affections, particularly those of the nervous kind, as hysterical and epileptic complaints. It may be taken from a few drops to the extent of a tea spoonful in a glass of wine or any similar vehicle.

CHAP. XXII. *Mixtures.**Camphorated mixture. L.*

- 479 TAKE of camphor, one dram; rectified spirit of wine, ten drops; double-refined sugar, half an ounce; boiling distilled water, one pint. Rub the camphor first with the spirit of wine, then with the sugar; lastly, add the water by degrees, and strain the mixture.

While camphor is often exhibited in a solid state, it is frequently also advantageous to employ it as diffused in watery fluids. And with this intention the present formula is perhaps one of the most simple, the union being affected merely by the aid of a small quantity of spirit of wine and a little sugar. But perhaps the more common form of emulsion in which the union is effected, by triturating the camphor with a few almonds, is not to be considered as inferior to this. For the unctuous quality of the almonds serves in a considerable degree to cover the pungency of the camphor without diminishing its activity. Camphor under the present form as well as that of emulsion, is very often useful in fevers, taken to the extent of a table spoonful every three or four hours.

Chalk mixture. L.

- 480 Take of prepared chalk, one ounce; double-refined sugar, six drams; gum-arabic, powdered, two ounces; distilled water, two pints. Mix them.

Chalk-drink. E.

Take of prepared chalk, one ounce; purest refined sugar, half an ounce; mucilage of gum-arabic, two ounces. Rub them together, and add by degrees, water, two pounds and an half; spirituous cinnamon water, two ounces.

These two preparations agree pretty much both in their name and in their nature. But of the two formulæ that of the Edinburgh college is most agreeable to the palate, from containing a proportion of cinnamon water, by which the disagreeable taste of the chalk is taken off.

In the former edition of the Edinburgh pharmacopœia, a preparation of this kind stood among the decoctions, and the chalk was directed to be boiled with the water and gum: by the present formula, the chalk is much more completely suspended by the mucilage and sugar; which last gives also to the mixture an agreeable taste. It is proper to employ the finest sugar, as the redundant acid in the coarser kinds might form with the chalk a kind of earthy salt. It would perhaps have been more proper to have added an aromatic, by suspending the entire powder of cinnamon, or its oil, by means of the mucilage and sugar: The method here directed is, however, less exceptionable in this than many other preparations, as the precipitated matter of the spirituous water will probably be inviscated in the saccharine and mucilaginous matter. This is a very elegant form of exhibiting chalk, and is an useful remedy in diseases arising from, or accompanied with, acidity in the primæ viæ. It is frequently employed in diarrhœa proceeding from that cause. The

mucilage not only serves to keep the chalk uniformly diffused, but also improves its virtues by sheathing the internal surface of the intestines. The dose of this medicine requires no nicety. It may be taken to the extent of a pound or two in the course of a day.

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tions.*Musk mixture. L.*

Take of musk, two scruples; gum arabic, powdered, double-refined sugar, of each one dram; rose-water, six ounces by measure. Rub the musk first with the sugar, then with the gum, and add the rose-water by degrees.

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This had formerly the name of *julepum e moscho*, and was intended as an improvement upon the hysseric julep with musk of Bates. Orange-flower-water is directed by that author; and indeed this more perfectly coincides with the musk than rose-water: but as the former is difficultly procurable in perfection, the latter is here preferred. The julep appears turbid at first: on standing a little time, it deposits a brown powder, and becomes clear, but at the same time loses great part of its virtue. This inconvenience may be prevented by thoroughly grinding the musk with gum-arabic before the addition of the water: by means of the gum, the whole substance of the musk is made to remain suspended in the water. Volatile spirits are in many cases an useful addition to musk, and likewise enable water to keep somewhat more of the musk dissolved than it would otherwise retain.

Almond milk. L.

Take of sweet almonds, one ounce and an half; double-refined sugar, half an ounce; distilled water, two pints. Beat the almonds with the sugar; then, rubbing them together, add by degrees the water, and strain the liquor.

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Common emulsion. E.

Take of sweet almonds, one ounce; bitter almonds, one dram; common-water, two pounds and a half. Beat the blanched almonds in a stone mortar, and gradually pour on them the common water, working the whole well together, then strain off the liquor.

Arabic emulsion. E.

This is made in the same manner as the preceding; only adding, while beating the almonds, of mucilage of gum-arabic two ounces.

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All these may be considered as possessing nearly the same qualities. But of the three the last is the most powerful demulcent.

Great care should be taken, that the almonds be not become rancid by keeping; which will not only render the emulsion extremely unpleasant, a circumstance of great consequence in a medicine that requires to be taken in large quantities, but likewise give it injurious qualities little expected from preparations of this class. The addition of the bitter almonds now ordered by the Edinburgh college in preparing these emulsions, may perhaps preserve them in some degree from suffering the above changes; but it is much more useful as giving the emulsion an agreeable flavour. And although the substance of bitter almonds be of a deleterious

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rious nature, yet nothing is to be apprehended from the quantity here employed.

These liquors are principally used for diluting and obtunding acrimonious humours; particularly in heat of urine and stranguries arising either from a natural sharpness of the juices, or from the operation of cantharides and other irritating medicines: in these cases, they are to be drank frequently, to the quantity of half a pint or more at a time.

Some have ordered emulsions to be boiled, with a view to deprive them of some imaginary crudity; but by this process they quickly cease to be emulsions, the oil separating from the water, and floating distinctly on the surface. Acids and vinous spirits produce a like decomposition. On standing also for some days, without addition, the oily matter separates and rises to the top, not in a pure form, but like thick cream. These experiments prove the composition of the emulsions made from the oily seeds of kernels, and at the same time point out some cautions to be attended to in their preparation and use.

Ammoniacum milk. L.

- 484 Take of ammoniacum, two drams; distilled water, half a pint. Rub the gum-resin with the water, gradually poured on, until it becomes a milk. In the same manner may be made a milk of asafœtida, and of the rest of the gum-resins.

The ammoniacum milk is used for attenuating tough phlegm, and promoting expectoration, in humoral asthmas, coughs, and obstructions of the viscera. It may be given to the quantity of two spoonfuls twice a day.

The lac asafœtida is employed in spasmodical, hysterical, and other nervous affections. And it is also not unfrequently used under the form of injection. It answers the same purposes as asafœtida in substance.

Compound spirit of vitriolic æther. L.

- 485 Take of spirit of vitriolic æther, two pounds; oil of wine, three drams. Mix them.

This is supposed to be, if not precisely the same, at least very nearly, the celebrated mineral anodyne liquor of Hoffman; as we learn from his own writings, that the liquor which he thus denominated was formed of dulcified spirit of vitriol and the aromatic oil which arises after it, but he does not tell us in what proportions these were combined. It has been highly extolled as an anodyne and antispasmodic medicine; and with these intentions it is not unfrequently employed in practice.

Compound spirit of ammonia. L.

- 486 Take of spirit of ammonia, two pints; essential oil of lemon, nutmeg, of each two drams. Mix them.

This differs almost only in name from the following.

Volatile aromatic spirit, commonly called volatile oily spirit, and saline aromatic spirit. E.

Take of vinous spirit of sal ammoniac, eight ounces; distilled oil of rosemary, one dram and a half; distilled oil of lemon-peel, one dram. Mix them that the oils may be dissolved.

By the method here directed, the oils are as completely dissolved as when distillation is employed.

Volatile salts, thus united with aromatics, are not only more agreeable in flavour, but likewise more acceptable to the stomach, and less acrimonious than in their pure state. Both the foregoing compositions turn out excellent ones, provided the oils are good, and the distillation skilfully performed. The dose is from five or six drops to sixty or more.

Medicines of this kind might be prepared extemporaneously, by dropping any proper essential oil into the dulcified spirit of sal ammoniac, which will readily dissolve the oil without the assistance of distillation. But it is perhaps preferable that they should be kept in the shops ready mixed.

Succinated spirit of ammonia. L.

Take of alcohol, one ounce; water of pure ammonia, four ounces by measure; rectified oil of amber, one scruple; soap, ten grains. Digest the soap and oil of amber in the alcohol till they be dissolved; then add the water of pure ammonia, and mix them by shaking.

This composition is extremely penetrating, and has lately come into esteem, particularly for smelling to in lownesses and faintings, under the name of *eau de luce*. It has been hitherto brought from France. It is not quite limpid, for the oil of amber dissolves only imperfectly in the spirit: if the volatile spirit be not exceedingly strong, scarcely any of the oil will be imbibed.

The *eau de luce* is not only used with the view of making an impression on the nose, but is taken internally in the same cases. It has likewise of late been celebrated as a remedy for the bite of the rattlesnake, when used internally, and applied externally to the wounded part.

Camphorated spirit. L.

Take of camphor, four ounces; rectified spirit of wine, two pints: Mix them, so that the camphor may be dissolved.

Of this we have already had occasion to speak in the preceding chapter under the title given to it by the Edinburgh college.

Simple oily emulsion. Gen.

Take of almond oil, one ounce; syrup of althea, an ounce and a half; gum-arabic, half an ounce; spring water, six ounces. Mix, and make an emulsion according to art.

Volatile oily emulsion. Gen.

Take of almond oil, an ounce and a half; syrup of althea, one ounce; gum-arabic, half an ounce; volatile alkaline salt, one dram; spring-water, seven ounces. Mix them according to art.

Both these are elegant and convenient modes of exhibiting oil internally. And under these forms it is often advantageously employed in cases of cough, hoarseness, and similar affections. By means of the alkali, a more intimate union of oil with water is obtained than can be had with the intermedium either of syrup or vegetable mucilage; and in some cases, the

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the alkali both contributes to answer the intention in view, and prevents the oil from exciting sickness at stomach: But in other instances, the pungency which it imparts is disagreeable to the patient and unfavourable to the disease. According to these circumstances, therefore, where an oily mixture is to be employed, the practitioner will be determined in his choice to have recourse either to the one or the other formula.

Acid julep. Gen.

- 490 Take of weak vitriolic acid, three drams; simple syrup, three ounces; spring-water, two pounds. Mix them.

In this state, the vitriolic acid is sufficiently diluted to be taken with ease in considerable doses. And it may thus be advantageously employed in various affections; concerning which we have already had occasion to make a few remarks in CHEMISTRY, n° 617. (see CHEMISTRY-Index), and which are to be answered, either by its action on the stomach, or on the system in general.

Æther julep. Gen.

- 491 Take of pure vitriolic æther, two scruples; spring-water, six ounces; refined sugar, half an ounce. Mix them according to art.

Although it is in general proper that æther should be diluted only when it is to be immediately used, yet it is sometimes necessary that it should be put into the hands of the patient in the state in which it is to be taken. In such instances the present formula is a very proper one; for the addition of a little mucilage tends both to cover the pungency of the æther in the mouth, and to retain it in a state of mixture with the water.

Amber julep. Gen.

- 492 Take of tincture of amber, two drams; refined sugar, half an ounce; spring-water, six ounces. Mix them according to art.

Under this form the tincture of amber is so far diluted and sweetened, as to form an agreeable mixture; and in this manner it may often be advantageously employed for counteracting nervous affections, and answering those other purposes for which we have already mentioned that this article is had recourse to in practice.

Saline mixture, or julep. Suec.

- 493 Take of fixed vegetable alkali, three drams; river-water, half a pound. To this lixivium add, lemon-juice, half a pound, or as much as is sufficient to saturate the alkali; syrup of black currants, one ounce.

This mixture is frequently prescribed in febrile diseases as a means of promoting a slight discharge by the surface: For where the skin is parched with great increased heat, it generally operates as a gentle diaphoretic. It often also promotes a discharge by the kidneys, and is not unfrequently employed to restrain vomiting. With these intentions it is in daily use among British practitioners, although it has no place in our pharmacopœias, from its being entirely an extemporaneous prescription.

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Mineral solution of arsenic.

Take of white arsenic, reduced to a subtile powder, fixed vegetable alkali, each sixty-four grains; distilled water, half a pint. Put them into a florentine flask, and let this be placed in a sand heat, so that the water may boil gently till the arsenic be completely dissolved; then add to the solution when cold half an ounce of spirit of lavender, and as much distilled water as to make the solution amount to a pint by measure, or fifteen ounces and an half by weight.

For the introduction of this remedy we are indebted to Dr Fowler of Stafford. We have already had occasion to mention it in our article ARSENIC, n° 14; see also CHEMISTRY, n° 1266, &c. In the former of these places we have observed, that if it be not precisely the same, it is at least supposed to be very analogous to a remedy which has had a very extensive sale in some parts of England under the name of the *tasteless ague drop*; and which has been employed with very great success in the cure of obstinate intermittents. But whether the present formula in any degree approaches to the tasteless ague drop or not, there can be no doubt, from the concurring testimony of many eminent practitioners, that it is equally successful in combating intermittents. For this purpose it is given according to the age and other circumstances of the patient in doses from two to twenty drops, once, twice, or oftener in the course of the day: And its use has been found to be attended with remarkable success, although with some patients even very small doses have been found to excite severe vomiting. Besides distinctly marked intermittents, this solution has also been sometimes successful in obstinate periodical headaches, and in cutaneous affections of the leprous kind, resisting every other mode of cure. And perhaps in every case where arsenic can be employed with safety or advantage internally, this preparation is preferable to any other with which we are yet acquainted.

CHAP XXIII. *Syrups.*

SYRUPS are saturated solutions of sugar, made in water, or watery or vinous infusions, or in juices. They were formerly considered as medicines of much greater importance than they are thought to be at present. Syrups and distilled waters were for some ages used as the great alteratives; insomuch that the evacuation of any peccant humour was never attempted till by a due course of these it had first been supposed to be regularly prepared for expulsion. Hence arose the exuberant collection of both, which we meet with in pharmacopœias, and like errors have prevailed in each. As multitudes of distilled waters have been compounded from materials unfit to give any virtue over the helm; so numbers of syrups have been prepared from ingredients, which in this form cannot be taken in sufficient doses to exert their virtues; for two-thirds of a syrup consist of sugar, and greatest part of the remaining third is an aqueous fluid.

Syrups are at present chiefly regarded as convenient vehicles for medicines of greater efficacy; and used

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for sweetening draughts and juleps, for reducing the lighter powders into boluses, pills, or electuaries, and other similar purposes. Some likewise may not improperly be considered as medicines themselves; as those of saffron, buckthorn-berries, and some others.

To the chapter on *Syrups* the London college in their pharmacopœia have premised the following general observations.

In the making of syrups, where we have not directed either the weight of the sugar, or the manner in which it should be dissolved, this is to be the rule:

Take of double-refined sugar, twenty-nine ounces; any kind of liquor, one pint. Dissolve the sugar in the liquor in a water-bath; then set it aside for twenty-four hours; take off the scum, and pour off the syrup from the feces if there be any.

The following are the general rules which have commonly been given with respect to the preparation of syrups.

I. All the rules laid down for making decoctions are likewise to be observed in the decoctions for syrups. Vegetables, both for decoctions and infusions, ought to be dry, unless they are expressly ordered otherwise.

II. In both the London and Edinburgh pharmacopœias, only the purest or double-refined sugar is allowed.

In the syrups prepared by boiling, it has been customary to perform the clarification with whites of eggs after the sugar had been dissolved in the decoction of the vegetable. This method is apparently injurious to the preparation; since not only the impurities of the sugar are thus discharged, but a considerable part likewise of the medicinal matter, which the water had before taken up from the ingredients, is separated along with them. Nor indeed is the clarification and despumation of the sugar, by itself, very advisable; for its purification by this process is not so perfect as might be expected: after it has undergone this process, the refiners still separate from it a quantity of oily matter, which is disagreeable to weak stomachs. It appears therefore most eligible to employ fine sugar for all the syrups; even the purgative ones (which have been usually made with coarse sugar, as somewhat coinciding with their intention) not excepted; for, as purgative medicines are in general ungrateful to the stomach, it is certainly improper to employ an addition which increases their offensiveness.

III. Where the weight of the sugar is not expressed, twenty-nine ounces are to be taken in every pint of liquor. The sugar is to be reduced into powder, and dissolved in the liquor by the heat of a water-bath, unless ordered otherwise.

Although in the formula of several of the syrups, a double weight of sugar to that of the liquor is directed, yet less will generally be sufficient. First, therefore, dissolve in the liquor an equal weight of sugar, then gradually add some more in powder, till a little remains undissolved at the bottom, which is to be afterwards incorporated by setting the syrup in a water-bath.

The quantity of sugar should be as much as the liquor is capable of keeping dissolved in the cold: if there is more, a part of it will separate, and concrete into crystals or candy; if less, the syrup will be sub-

ject to ferment, especially in warm weather, and change into a vinous or four liquor. If in crystallizing, only the superfluous sugar be separated, it would be of no inconvenience; but when part of the sugar has candied, the remaining syrup is found to have an under proportion, and is as subject to fermentation as if it had wanted sugar at first.

IV. Copper-vessels, unless they be well tinned, should not be employed in the making of acid syrups, or such as are composed of the juices of fruits.

The confectioners, who are the most dexterous people at these kinds of preparations, to avoid the expence of frequently new-tinning their vessels, rarely make use of any other than copper ones untinned, in the preparation even of the most acid syrups, as of oranges and lemons. Nevertheless, by taking due care that their coppers be well scoured and perfectly clean, and that the syrup remain no longer in them than is absolutely necessary, they avoid giving it any ill taste or quality from the metal. This practice, however, is by no means to be recommended to the apothecary.

V. The syrup, when made, is to be set by till next day; if any saccharine crust appears upon the surface it is to be taken off.

Syrup of vinegar. E.

Take of vinegar, two pounds and an half; refined sugar, three pounds and an half. Boil them till a syrup be formed.

This is to be considered as simple syrup merely acidulated, and is by no means unpleasant. It is often employed in mucilaginous mixtures and the like; and on account of its cheapness it is often preferred to syrup of lemons.

Syrup of marshmallow.

Take of fresh root of marshmallow, bruised, one pound; double-refined sugar, four pounds; distilled water, one gallon. Boil the water with the marshmallow root to one half, and press out the liquor when cold. Set it by twelve hours; and, after the feces have subsided, pour off the liquor. Add the sugar, and boil it to the weight of six pounds. *L.*

Take of marshmallow roots, somewhat dried, nine ounces; water, ten pounds; purest sugar, four pounds. Boil the water with the roots to the consumption of one half, and strain the liquor, strongly expressing it. Suffer the strained liquor to rest till the feces have subsided; and when it is free from the dregs, add the sugar; then boil so as to make a syrup. *E.*

The syrup of marshmallows seems to have been a sort of favourite among dispensatory writers, who have taken great pains to alter and amend it, but have been wonderfully tender in retrenching any of its articles. In the last prescription, it is lopt of its superfluities, without any injury to its virtues. It is used chiefly in nephritic cases, for sweetening emollient decoctions, and the like: of itself it can do little service, notwithstanding the high opinion which some have entertained of it; for what can be expected from two or three spoonfuls of the syrup, when the decoction, from which two or three pounds are made, may be taken at a draught or two? It is sometimes useful in tickling coughs,

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coughs, by inviscating irritating matter distilling in the fauces: in this way it sometimes affords considerable relief.

Syrup of clove July-flower.

- 498 Take of fresh clove July-flowers, the heels being cut off, two pounds; boiling distilled water, six pints. Macerate the flowers for twelve hours in a glass vessel; and in the strained liquor dissolve the double-refined sugar, that it may be made a syrup. *L.*

Take of clove July-flowers, fresh gathered and freed from the heels, one pound; purest sugar, seven pounds and a quarter; boiling water, four pounds. Macerate the flowers in the water for a night; then to the strained liquor add the sugar previously beat, and dissolve it by a gentle heat, to make the whole into a syrup. *E.*

This syrup is of an agreeable flavour, and a fine red colour; and for these it is chiefly valued. Some have substituted for it one easily preparable at seasons when the flowers are not to be procured: an ounce of clove spice is infused for some days in twelve ounces of white wine, the liquor strained, and, with the addition of twenty ounces of sugar, boiled to a proper consistence; a little cochineal renders the colour of this syrup exactly similar to that prepared from the clove July-flower; and its flavour is of the same kind, though not so pleasant. The abuse may be readily detected by adding to a little of the syrup some alkaline salt or ley; which will change the genuine syrup to a green colour; but in the counterfeit, it will make no such alteration, only varying the shade of the red.

As the beauty of the colour is a principal quality in this syrup, no force in the way of expression should be used in separating the liquor from the flowers.

Syrup of colchicum. E.

- 499 Take of colchicum root, fresh and succulent, cut into small pieces, one ounce; vinegar, sixteen ounces; purest sugar, twenty-six ounces. Macerate the root in the vinegar two days, now and then shaking the vessel; then strain it with a gentle pressure. To the strained liquor add the sugar, and boil a little, so as to form a syrup.

This syrup seems to be the best preparation of the colchicum; great care is required to take up this root in the proper season: and from errors of this kind we are to ascribe the uncertainty in the effects of this medicine as found in the shops.

The syrup of colchicum is often successfully employed as a diuretic, and may be taken from a dram or two to the extent of an ounce or more.

Syrup of orange-peel.

- 500 Take of fresh outer-rind of Seville-oranges, eight ounces; boiling distilled water, five pints. Macerate for twelve hours in a close vessel; and in the strained liquor dissolve double-refined sugar to make a syrup. *L.*

Take of yellow rind of Seville orange-peel fresh, six ounces; boiling water, three pounds. Infuse them for a night in a close vessel; then strain the liquor; let it stand to settle; and having poured it off clear from the sediment, dissolve in it four pounds and a

quarter of white sugar, so as to make it into a syrup with a gentle heat. *E.*

In making this syrup, it is particularly necessary that the sugar be previously powdered, and dissolved in the infusion with as gentle a heat as possible, to prevent the exhalation of the volatile parts of the peel. With these cautions, the syrup proves a very elegant and agreeable one, possessing great share of the fine flavour of the orange-peel.

Syrup of saffron. L.

- Take of saffron, one ounce; boiling distilled water, one pint. Macerate the saffron, in the water, for twelve hours, in a close vessel; and dissolve double-refined sugar in the strained liquor, that it may be made a syrup. 501

Saffron is very well fitted for making a syrup, as in this form a sufficient dose of it is contained in a reasonable compass. This syrup is at present frequently prescribed; it is a pleasant cordial, and gives a fine colour to juleps.

Syrup of lemon-juice.

- Take of lemon-juice, strained, after the feces have subsided, two pints; double-refined sugar, fifty ounces. Dissolve the sugar, that it may be made a syrup. *L.* 502
Take of juice of lemons, suffered to stand till the feces have subsided, and afterwards strained, two pounds and a half; double-refined sugar, fifty ounces. Dissolve the sugar in the juice, so as to make a syrup. *E.*

Syrup of mulberry-juice. L.

Syrup of raspberry juice. L.

Syrup of black currants. L.

These three are directed by the London college to be prepared in the same manner as syrup of lemons, which immediately precedes them.

All these four are very pleasant cooling syrups; and with this intention they are occasionally used in draughts and juleps, for quenching thirst, abating heat, &c. in bilious or inflammatory distempers. They are sometimes likewise employed in gargarisms for inflammations of the mouth and tonsils.

Syrup of the white poppy. L.

- Take of the heads of white poppies, dried, and the seeds taken out, three pounds and an half; double-refined sugar, six pounds; distilled water, eight gallons. Slice and bruise the heads, then boil them in the water, to three gallons, in a water-bath saturated with sea-salt, and press out the liquor. Reduce this by boiling to about the measure of four pints, and strain it while hot, first through a sieve, then through a thin woollen cloth, and set it aside for twelve hours, that the feces may subside. Boil the liquor, poured off from the feces, to three pints, and dissolve the sugar in it that it may be made a syrup. 503

Syrup of white poppies, or of meconium, commonly called diacodium. E.

- Take of white poppy heads, dried, and freed from the seeds,

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seeds, two pounds; boiling-water, thirty pounds; purest sugar, four pounds. Macerate the bruised heads in the water for a night; next boil till only one-third part of the liquor remain; then strain it, expressing it strongly. Boil the strained liquor to the consumption of one half, and strain again; lastly, add the sugar, and boil to a syrup. It may also be made by dissolving in two pounds and a half of simple syrup, one dram of the extract of white poppies.

This syrup, impregnated with the opiate matter of the poppy heads, is given to children in doses of two or three drams; to adults from half an ounce to an ounce and upwards, for easing pain, procuring rest, and answering the other intentions of mild opiates. Particular care is requisite in its preparation, that it may be always made, as nearly as possible, of the same strength; and accordingly the colleges have been very minute in their description of the process.

Syrup of the red poppy. L.

- 504 Take of the fresh flowers of the wild or red poppy, four pounds; boiling distilled water, four pints and an half. Put the flowers by degrees into the boiling water in a water-bath, constantly stirring them. After this, the vessel being taken out of the bath, macerate for twelve hours; then press out the liquor, and set it apart, that the feces may subside. Lastly, make it into a syrup, with double-refined sugar.

The design of putting the flowers into boiling water in a water-bath is, that they may be a little scalded, so as to shrink enough to be all immersed in the water; without this artifice they can scarcely be all got in: but they are no longer to be continued over the fire than till this effect is produced, lest the liquor become too thick, and the syrup be rendered ropy.

This syrup has been recommended in disorders of the breast, coughs, spitting of blood, pleurifies, and other diseases, both as an emollient and as an opiate. It is one of the lightest of the opiate medicines; and in this respect so weak, that some have doubted of its having any anodyne quality. We indeed presume, that it might be very safely superseded altogether; and accordingly it has now no place either in the Edinburgh pharmacopœia, or some of the best foreign ones, though still retained by the London college.

Rose syrup. L.

- 505 Take of the dried leaves of the damask rose, seven ounces; double-refined sugar, six pounds; boiling distilled water, four pints. Macerate the rose leaves in water for twelve hours, and strain. Evaporate the strained liquor to two pints and an half, and add the sugar, that it may be made a syrup.

Syrup of pale roses. E.

Take of pale roses, fresh gathered, one pound; boiling water, four pounds; white sugar, three pounds. Macerate the roses in the water for a night; then to the liquor strained, and freed from the dregs, add the sugar; and boil them into a syrup.

This syrup may likewise be made from the liquor remaining after the distillation of rose-water depurated from its feces.

The liquor remaining after the distillation of roses (provided the still has been perfectly clean) is as proper for making this syrup as a fresh infusion; for the distillation only collects those volatile parts which are dissipated in the air while the infusion is boiling to its consistence. This syrup is an agreeable and mild purgative for children, in the dose of half a spoonful or a spoonful. It likewise proves gently laxative to adults; and with this intention may be of service in costive habits. Its principle use is in solutive glysters.

Syrup of dry roses. E.

- Take of red roses, dried, seven ounces; white sugar, six pounds; boiling water, five pounds. Infuse the roses in the water for a night, then boil them a little; strain out the liquor, and adding to it the sugar, boil them to the consistence of a syrup.

This syrup is supposed to be mildly astringent; but is principally valued on account of its red colour. The London college have omitted it, having retained others at least equal to it in that respect.

Syrup of squills. E.

- Take of vinegar of squills, two pounds; white sugar, three pounds and a half. Make them into a syrup with a gentle heat.

This syrup was formerly prepared with some spices, intended to alleviate the offensiveness of the squills. But while they had not this effect, they often counteracted the intention in view, and are therefore omitted. It is used chiefly in doses of a spoonful or two, for promoting expectoration, which it does very powerfully.

Simple or common syrup. E.

- Take of purest sugar, fifteen parts; water, eight parts. Let the sugar be dissolved by a gentle heat.

This preparation is a plain liquid sweet, void of flavour or colour. It is convenient for sundry purposes where these qualities are not wanted, or would be exceptionable.

Syrup of buckthorn.

- Take of the juice of ripe and fresh buckthorn berries, one gallon; ginger, bruised, one ounce; all-spice, powdered, one ounce and an half; double-refined sugar, seven pounds. Set by the juice for some days, that the feces may subside, and strain. Macerate the ginger and all-spice in a pint of the strained juice for four hours, and strain. Boil away the rest of the juice to three pints; then add that part the juice in which the ginger and all-spice have been macerated; and, lastly, the sugar, that it may be made a syrup. L.

- Take of juice of the ripe buckthorn berries, depurated, seven pounds and a half; white sugar, three pounds and a half. Boil them to the consistence of a syrup. E.

Both these preparations, in doses of three or four spoonfuls, operate as brisk cathartics. The principal inconveniences attending them are, their being very unpleasant, and their occasioning a thirst and dryness of the mouth and fauces, and sometimes violent gripes. These effects may be prevented by drinking freely of water.

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water-gruel, or other warm liquids, during the operation. The ungratefulness of the buckthorn is endeavoured to be remedied in the first of the above prescriptions by the addition of aromatics, which, however, are scarcely sufficient for that purpose. The second also had formerly an aromatic material for the same intention, a dram of the essential oil of cloves; which being found ineffectual, is now rejected.

Syrup of balsam of Tolu. L.

510 Take of the balsam of Tolu, eight ounces; distilled water, three pints. Boil for two hours. Mix with the liquor, strained after it is cold, the double-refined sugar, that it may be made a syrup.

Balsamic syrup. E.

Take of simple syrup, just made, and warm from the fire, two pounds; tincture of balsam of Tolu, one ounce. When the syrup has grown almost cold, stir into it the tincture, by little at a time, agitating them well together till perfectly united.

This last method of making the balsamic syrup was dropt in one of the preceding editions of the Edinburgh pharmacopœia, on a complaint that the spirit spoiled the taste of the syrup; which it did in a great degree when the tincture was drawn with malt spirits, the nauseous oil which all the common malt spirits are accompanied with communicating that quality; and this was particularly the case when the spirituous part was evaporated from the syrup, as was directed in the former edition of the Edinburgh pharmacopœia. Particular care therefore should be taken that the spirit employed for making the tincture be perfectly clean, and well rectified from all ill flavour.

The intention of the contrivers of the two foregoing processes seems to have been somewhat different. In the first, the more subtle and fragrant parts of the balsam are extracted from the grosser resinous matter, and alone retained in the syrup: the other syrup contains the whole substance of the balsam in larger quantity. They are both moderately impregnated with the agreeable flavour of the balsam.

In some pharmacopœias a syrup of this kind is prepared from a tincture of balsam of Peru, with rose-water, and a proper quantity of sugar.

Syrup of violets.

511 Take of the fresh petals of the violet, two pounds; boiling distilled water, five pints. Macerate for 24 hours; afterwards strain the liquor, without pressing, through thin linen. Add refined sugar, that it may be made a syrup. *L.*

Take of fresh violets, one pound; boiling water, four pounds; purest sugar, seven pounds and a half. Macerate the violets in the water for 24 hours in a glass, or at least a glazed earthen vessel, close covered; then strain without expression, and to the strained liquor add the sugar powdered, and make into a syrup. *E.*

This syrup is of a very agreeable flavour; and in the quantity of a spoonful or two proves to children gently laxative. It is apt to lose, in keeping, the elegant blue colour, for which it is chiefly valued; and

hence some have been induced to counterfeit it with materials whose colour is more permanent. This abuse may be readily discovered, by adding to a little of the suspected syrup any acid or alkaline liquor. If the syrup be genuine, the acid will change its blue colour to a red, and the alkali will change it to a green; but if counterfeit, these changes will not happen. It is obvious, from this mutability of the colour of the violet, that the prescriber would be deceived if he should expect to give any blue tinge to acidulated or alkalized juleps or mixtures by the addition of the blue syrup.

Syrup of ginger.

Take of ginger, bruised, four ounces; boiling distilled water, three pints. Macerate for four hours, and strain; then add refined sugar, that it may be made a syrup. *L.*

Take of powdered ginger, three ounces; boiling water, four pounds; purest sugar, seven pounds and a half. Macerate the ginger in the water in a close vessel for 24 hours; then to the liquor, strained and freed from the feces, add the powdered sugar, and make them into a syrup. *E.*

These are agreeable and moderately aromatic syrups, lightly impregnated with the flavour and virtues of the ginger.

Acid of syrup. Gen.

Take of weak spirit of vitriol, two drams; syrup of lemons, six ounces. Mix them.

Where we wish to obtain a syrup, not only strongly acidulated, but also powerfully astringent, this formula may be considered as well suited to answer the purpose.

Alkaline syrup. Gen.

Take of salt of tartar, three drams; simple syrup, six ounces. Mix them.

In this syrup we have in some degree the converse of the preceding; and it may be usefully employed either for the destruction of acid in the stomach, or for the formation of neutral or effervescent mixtures.

Syrup of garlic. Suec.

Take of the fresh root of garlic, sliced, one pound; boiling water, two pounds. Macerate them in a close vessel for an hour. Add to the strained liquor, refined sugar, two pounds. Boil them to a syrup.

This syrup formerly held a place in our pharmacopœias, and was recommended for promoting expectoration in cases of chronic catarrh and other affections of the breast: but, as well as the oxymel of garlic, it is now banished from them; and there can be little doubt that the same intentions may in general be answered by less disagreeable medicines. Yet where we wish to employ garlic in a watery menstruum, this formula is perhaps one of the best under which it can be exhibited.

Syrup of almonds. Suec.

Take of sweet almonds, one pound; bitter almonds, two drams. Let the almonds be blanched and beat in a stone mortar with a wooden pestle; then by degrees add barley-water, two pounds; strain the liquor,

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liquor, and form it into a syrup, with as much double-refined sugar as may be necessary.

The agreeable flavour of the almonds is in this formula communicated to a syrup, which may be advantageously employed to sweeten mixtures, or to form a pleasant drink when diffused in water; and the flavour is not a little improved by the addition of the proportion of bitter almonds here directed. But even these cannot be supposed to communicate any active quality to this syrup, as they are employed in so small a quantity: and still less is to be expected from the sweet almonds, which can communicate little more to the syrup than their mild oil.

Syrup of cinnamon. Ross.

- 517 Take of cinnamon, bruised, five ounces; spirituous cinnamon water, two pounds. Digest them in a close glass vessel for 24 hours; then add to the strained liquor double-refined sugar, three pounds. Boil it to a syrup.

This syrup is strongly impregnated with the cinnamon; and where we wish to sweeten any mixture, at the same time adding to it an agreeable aromatic, it is perhaps one of the best articles we can employ.

Emetic syrup. Brun.

- 518 Take of glass of antimony, finely powdered, two drams; Rhemish wine, twelve ounces. Let them be digested for three days in a gentle heat; then strain the liquor through paper, and mix with the strained liquor 30 ounces of double-refined sugar. Let it be formed into a syrup, and kept in a close vessel.

There can be no doubt of this syrup being strongly impregnated with the emetic quality of the antimony; and it will at least have so far the advantage of being very agreeable to the taste, that it may be readily taken by very young people. But every good effect to be obtained from it may be had with more certainty, by adding to simple syrup any quantity that may be thought necessary of the antimonial tartar previously dissolved in a small proportion of water.

Syrup of quicksilver. Suec.

- 519 Take of purified quicksilver, one dram; gum arabic, three drams; rose-water, as much as sufficient for reducing the gum to a mucus. Let them be rubbed in a mortar till the quicksilver totally disappears; then by degrees mix with it simple syrup, four ounces.

In this we have a preparation similar to the mercurial solution of Dr Plenck formerly mentioned; and which, while it does not possess any other advantage than mere sweetness of taste, is liable to the objections formerly urged against that preparation.

CHAP. XXIV. *Medicated Honeys.*

- 520 THE more fixed parts of vegetables, dissolved in watery liquors, may be thence transferred into honey, by mixing the honey with the watery decoction or juice of the plant, and boiling them together till the aqueous part has exhaled, and the honey remains of its original consistence. Honey has not probably,

however, any very peculiar advantage over sugar, and it is liable to many inconveniences which sugar is free from: in particular, it is much more liable to run into fermentation, and in many constitutions produces gripes, and often violent effects. The Edinburgh college have therefore rejected the whole of the oxymels from their last edition of the pharmacopœia. And the number of preparations with honey in most of the foreign pharmacopœias is now much diminished. Still, however, there are several much employed by practitioners of eminence; and of course retained in the London pharmacopœia.

Honey of roses. L.

Take of dried red rose-buds, with the heels cut off, four ounces; boiling distilled water, three pints; clarified honey, five pounds. Macerate the rose leaves in the water for six hours; then mix the honey with the strained liquor, and boil the mixture to the thickness of a syrup.

This preparation is not unfrequently used as a mild cooling detergent, particularly in gargarisms for ulcerations and inflammation of the mouth and tonsils. The rose-buds here used should be hastily dried: the design of doing so is, that they may the better preserve their astringency.

Honey of squills. L.

Take of clarified honey, three pounds; tincture of squills, two pints. Boil them in a glass vessel to the thickness of a syrup.

The honey will here be impregnated with all the active parts of the squills which the tincture before contained, and may be employed as an useful expectorant or diuretic.

Oxymel of verdigrise. L.

Take of prepared verdigrise, one ounce; vinegar, seven ounces; clarified honey, fourteen ounces. Dissolve the verdigrise in the vinegar, and strain it through linen; then add the honey, and boil the whole to a proper thickness.

This is an improvement of what was formerly known in our pharmacopœias under the title of *mel Ægyptiacum*; which, however, was, as then prepared, very uncertain with respect to strength. It is used only externally for cleansing foul ulcers, and keeping down fungous flesh. It is also often serviceable in venereal ulcerations of the mouth and tonsils. But there is some danger from its application to places from the situation of which it is apt to be swallowed; for even a small quantity of verdigrise passing into the stomach may be productive of distressing, if not deleterious, effects.

Oxymel of meadow saffron. L.

Take of the fresh root of meadow-saffron, cut into thin slices, one ounce; distilled vinegar, one pint; clarified honey, two pounds. Macerate the root of meadow-saffron with the vinegar, in a glass vessel, with a gentle heat, for 48 hours. Strain the liquor, pressed out strongly from the root, and add the honey. Lastly, boil the mixture, frequently stirring it with a wooden spoon, to the thickness of a syrup.

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This oxymel may be considered as very analogous to the syrup of colchicum, of which we have already made some observations. Under this form it was first introduced by Dr Stoerk. And although with certain constitutions the syrup is unquestionably preferable, yet it well deserves a place in our pharmacopœias, as being an active medicine.

Oxymel of squills. L.

- 525 Take of clarified honey, three pounds; vinegar of squills, two pints. Boil them in a glass vessel, with a slow fire, to the thickness of a syrup.

The honey was formerly employed for this preparation unclarified, and the scum, which in such cases arises in the boiling, taken off: by this means the impurities of the honey were discharged; but some of the medicinal parts of the squills, with which the vinegar was impregnated, were also separated. For this reason the college of London have now judiciously ordered the honey for all these kinds of preparations to be previously clarified by itself.

Oxymel of squills is an useful aperient, detergent, and expectorant, and of great service in humoral asthmas, coughs, and other disorders where thick phlegm abounds. It is given in doses of two or three drams, along with some aromatic water, as that of cinnamon, to prevent the great nausea which it would otherwise be apt to excite. In large doses it proves emetic.

Simple oxymel. L.

- 526 Take of clarified honey, two pounds; distilled vinegar, one pint. Boil them in a glass vessel, with a slow fire, to the thickness of a syrup.

This preparation may be considered as analogous to the *syrupus aceti* of the Edinburgh pharmacopœia. It is not inferior in efficacy to many more elaborate compositions. It is an agreeable, mild, cooling medicine. It is often used in cooling detergent gargarisms, and not unfrequently as an expectorant.

Oxymel of garlic. Dan.

- 527 Take of garlic, cut in slices, an ounce and a half; caraway seeds, sweet fennel seeds, each two drams; clarified honey, ten ounces; vinegar, half a pint. Boil the vinegar for a little time, with the seeds bruised, in a glazed earthen vessel; then add the garlic, and cover the vessel close; when grown cold, press out the liquor, and dissolve in it the honey by the heat of a water bath.

This oxymel is recommended for attenuating viscid juices, promoting expectoration, and the fluid secretions in general. It is doubtless a medicine of considerable efficacy, though very unpleasant, the flavour of the garlic prevailing notwithstanding the addition of the aromatic seeds.

Pectoral oxymel. Brun.

- 528 Take of elecampane roots, one ounce; orris root, half an ounce; gum ammoniac, one ounce; vinegar, half a pint; clarified honey, one pound; water, three pints. Let the roots, cut and bruised, be boiled in the water till one-third is wasted: then strain off the liquor; let it stand to settle; and having poured it off clear from the feces, add to it

the honey and the ammoniac, previously dissolved in the vinegar. Mix them together, by gently boiling them.

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The title of this composition expresses its medical virtues. It is designed for those disorders of the breast that proceed from a load of viscid phlegm, and obstructions of the pulmonary vessels. Two or three spoonfuls may be taken every night and morning, and continued for some time.

CHAP. XXV. *Powders.*

529 THIS form receives such materials only as are capable of being sufficiently dried to become pulverisable without the loss of their virtue. There are many substances, however, of this kind, which cannot be conveniently taken in powder: bitter, acrid, fetid drugs, are too disagreeable; emollient and mucilaginous herbs and roots are too bulky; pure gums cohere, and become tenacious in the mouth; fixed alkaline salts liquefy on exposing the composition to the air; and volatile alkalis exhale. Many of the aromatics, too, suffer a greater loss of their odorous principle when kept in powder; as in that form they no doubt expose a much larger surface to the air.

The dose of powders, in extemporaneous prescription, is generally about half a dram: it rarely exceeds a whole dram, and is not often less than a scruple. Substances which produce powerful effects in smaller doses are not trusted to this form, unless their bulk be increased by additions of less efficacy; those which require to be given in larger ones are better fitted for other forms.

The usual vehicle for taking the lighter powders is any agreeable thin liquid. The ponderous powders, particularly those prepared from metallic substances, require a more consistent vehicle, as syrups; for from thin ones they soon subside. Resinous substances likewise are most commodiously taken in thick liquors; in thin ones they are apt to run into lumps, which are not easily again soluble.

General rules for making powders.

I. Particular care ought to be taken that nothing carious, decayed, or impure, be mixed in the composition of powders: the stalks and corrupted parts of plants are to be separated.

II. The dry aromatics ought to be sprinkled, during their pulverization, with a few drops of any proper water.

III. The moister aromatics may be dried with a very gentle heat before they are committed to the mortar.

IV. Gums, and such other substances as are difficultly pulverisable, should be pounded along with the drier ones, that they may pass the sieve together.

V. No part should be separated for use until the whole quantity put into the mortar has passed the sieve, and the several siftings mixed together; for those parts of the subject which are first powdered may prove different, at least in degree of efficacy, from the rest.

VI. Powders of aromatics are to be prepared only in small quantities at a time, and kept in glass vessels very closely stopped.

If powders are long kept, and not carefully secured from the air, their virtue is in a great measure destroyed, although

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although the parts in which it consists should not in other circumstances prove volatile. Thus, though the virtues of ipecacuanha are so fixed as to remain entire even in extracts made with proper menstrua, yet if the powdered root be exposed for a long time to the air, it loses its emetic quality.

Aloetic powder. L.

- 530 Take of socotorine aloes, one pound; white canella, three ounces. Rub them separately to powder, and then mix them.

This composition has long been known in the shops under the title of *hiera picra*. It furnishes us with an useful aloetic purgative, the canella operating as a good corrigent for the aloes. But it is more frequently employed as the basis of electuaries or pills, or of a tincture which was for a long time distinguished by the appellation of *sacred tincture*.

Aloetic powder with iron. L.

- 531 Take of socotorine aloes, powdered, an ounce and an half; myrrh, powdered, two ounces; dry extract of gentian, vitriolated iron, of each, in powder, one ounce. Mix them.

In this powder we have an aloetic and chalybeate conjoined. It consists of nearly the same articles which formerly entered the composition of the *pilula cephradice chalybeata*, as they were called; and it is perhaps more frequently employed when brought to the form of pills by means of syrups than in powder: but in either way it is an useful medicine, and is particularly employed with advantage in cases of obstructed menstruation.

Aloetic powder with guaiacum. L.

- 532 Take of socotorine aloes, one ounce and an half; gum guaiacum, one ounce; aromatic powder, half an ounce. Rub the aloes and gum guaiacum separately to powder; then mix all the ingredients together.

In the guaiacum, as well as the aloes, we have a warm gummi-resinous purgative; and both are corrected, as well as more minutely divided, from their combination with the aromatics. This therefore furnishes us with an useful purgative: but when taken only in small doses, its chief effect is that of promoting perspiration. It is, however, more frequently employed in the form of pills than in the state of powder; and indeed it consists of nearly the same ingredients which constituted the *pilula aromatica* of the former edition of the London pharmacopœia.

Aromatic powder. L.

- 533 Take of cinnamon, two ounces; smaller cardamom seeds husked, ginger, long pepper, of each one ounce. Rub them together to a powder.

Aromatic powder, or aromatic spices. E.

Take of nutmegs, lesser cardamom seeds, ginger, each two ounces. Beat them together into a powder, to be kept in a phial well shut.

Both these compositions are agreeable, hot, spicy medicines; and as such may be usefully taken in cold phlegmatic habits and decayed constitutions, for warming the stomach, promoting digestion, and strengthen-

ing the tone of the viscera. The dose is from ten grains to a scruple and upwards. The first is considerably the warmest. This principally arises from the quantity of long pepper which it contains. But it is perhaps to be doubted whether from this article any advantage be derived; and a powder not inferior to either might, we think, be formed, by substituting cassia for the cinnamon employed by the one college, or the nutmegs by the other.

Compound powder of asarabacca. L.

- Take of the dry leaves of asarabacca, sweet marjoram, Syrian herb massich, dry flowers of lavender, each one ounce. Powder them together.

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Sternutatory or cephalic powder. E.

Take of the leaves of asarum, three parts; marjoram, one part. Beat them together into a powder.

Though the former of these powders be more compounded than the latter, yet they differ very little. They are both agreeable and efficacious errhines, and superior to most of those usually sold under the name of *herb snuff*. They are often employed with great advantage in cases of obstinate headach, and of ophthalmias resisting other modes of cure. Taken under the form of snuff to the extent of five or six grains at bed-time, they will operate the succeeding day as a powerful errhine, inducing frequent sneezing, but still more a large discharge from the nose. It is, however, necessary, during their operation, to avoid exposure to cold.

Powder of ceruse. L.

- Take of ceruse, five ounces; farocoll, one ounce and an half; tragacanth, half an ounce. Rub them together into powder.

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This composition is the *trachisci albi* of Rhazes brought back to its original simplicity with regard to the ingredients, and without the needless trouble of making it into troches. It is employed for external purposes, as in collyria, lotions, and injections, for repelling acrimonious humours, and in inflammations.

Compound powder of crabs claws. L.

- Take of crabs claws, prepared, one pound; chalk, red coral, each, prepared, three ounces. Mix them.

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These powders have lost several of their ingredients without any injury to their virtues; and possibly they would still bear a farther reduction, for the crabs eyes and chalk are by themselves at least as effectual as any composition of them with coral. And perhaps every purpose to be obtained from them may be accomplished by a more simple absorbent, as the chalk powder afterwards to be mentioned, or the powder of the lapilli cancerorum.

Compound powder of contrayerva. L.

- Take of contrayerva, powdered, five ounces; compound powder of crabs claws, one pound and an half. Mix them.

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This powder was formerly directed to be made up into balls with water, and was then called *lapis contrayerva*; a piece of trouble now laid aside as needless, for it was necessary to reduce the balls into powder

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again before they could be used. Nor did that form contribute, as has been imagined, to their preservation; for it is scarcely to be supposed that the powder will lose more by being kept for a reasonable length of time in a close-stopt glass than the balls will in the humectation with water and exsiccation in the air before they are fit for being put by to keep. This medicine has much better claim to the title of an alexipharmac and sudorific than the foregoing compositions. The contrayerva by itself proves very serviceable in low fevers, where the *vis vite* is weak, and a diaphoresis to be promoted. It is possible that the crabs claws are of no farther service than as they divide this powerful ingredient, and make it fit more easily on the stomach.

Compound powder of chalk. L.

- 538 Take of prepared chalk, half a pound; cinnamon, four ounces; tormentil, gum-arabic, of each three ounces; long pepper, half an ounce. Powder them separately, and mix them.

Chalk powder. E.

Take of white chalk, prepared, four ounces; nutmeg, half a dram; cinnamon, one dram. Mix and make them into a powder; which may supply the place of the cardialgic troches.

The addition of the aromatics in the above formula, coincides with the general intention of the remedy which is indicated for weakness and acidity in the stomach; and in looseness from acidity.

Compound powder of chalk with opium. L.

Take of compound powder of chalk, eight ounces; hard purified opium, powdered, one dram and an half. Mix them.

From the addition of the opium this remedy becomes still more powerful than the above in restraining diarrhoea.

Compound powder of ipecacuanha. L.

- 539 Take ipecacuanha and hard purified opium, of each, powdered, one dram; vitriolated kali, powdered, one ounce. Mix them.

Sudorific, or Dover's powder. E.

Take of vitriolated tartar, three drams; opium, root of ipecacuanha powdered, of each one scruple. Mix, and grind them accurately together, so as to make an uniform powder.

The vitriolated tartar, from the grittiness of its crystals, is perhaps better fitted for tearing and dividing the tenacious opium than any other salt; this seems to be its only use in the preparation. The operator ought to be careful that the opium and ipecacuanha shall be equally diffused through the whole mass of powder, otherwise different portions of the powder must have differences in degree of strength.

The hard purified opium, directed by the London college, is, from this circumstance, preferable to opium in its ordinary state, employed by the Edinburgh college.

This powder is one of the most certain sudorifics

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that we know of; and as such, was recommended by Dr Dover as an effectual remedy in rheumatism. Modern practice confirms its reputation, not only in rheumatism, but also in dropsy and sundry other diseases, where it is often difficult by other means to produce a copious sweat. The dose is from five to ten or twelve grains, according as the patient's stomach and strength can bear it. It is convenient to avoid much drinking immediately after taking it, otherwise it is very apt to be rejected by vomiting before any other effects are produced.

Compound powder of jalap. E.

Take of jalap root, one ounce; crystals of tartar, two ounces. Mix, and diligently grind them together for some time, so as to form a very fine powder. 540

The use of the crystals in this preparation is to break down and divide the jalap into very minute particles, whereby its operation is thought to be meliorated; and on this account the two articles are directed to be pounded together, and not separately. But whether from this circumstance any advantage arises or not, there can be no doubt that this combination furnishes us with a very useful and active purgative, in every case where it is necessary to produce both a full evacuation of the intestinal canal, and a free discharge from the system in general, under the form of catharsis.

Compound powder of myrrh. L.

Take of myrrh, dried favin, dried rue, Russian castor, of each, one ounce. Rub them together into a powder. 541

This is a reformation of the troches of myrrh, a composition contrived by Rhazes against uterine obstructions. It may be taken in any convenient vehicle, or made into boluses, from a scruple to a dram or more, two or three times a-day.

Opiate powder. L.

Take of hard purified opium, powdered, one dram; burnt and prepared hartshorn, nine drams. Mix them. 542

The hartshorn is here intended merely to divide the opium, and to give it the form of powder, although it may perhaps have also some influence in rendering the opium more active from destroying acid in the stomach. But whether in this way it has any effect or not, there can be no doubt that it is a very convenient formula for the exhibition of opium in powder; which on some occasions is preferable to its being given either in a liquid form or in that of pills. As ten grains of this powder contain precisely one of the opium, the requisite dose may be easily adapted to the circumstances of the case. It is often successfully employed as a sweating powder; and has not, like Dover's powder, the effect of inducing sickness or vomiting.

Compound powder of scammony.

Take of scammony, hard extract of jalap, each two ounces; ginger, half an ounce. Powder them separately, and mix them. L. 543

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Take of scammony, crystals of tartar, each two ounces; mix, and grind them diligently into a powder. *E.*

It is much to be regretted, that in the pharmacopœias published by authority in Britain, two compositions should be distinguished by the same name, differing considerably from each other in their nature and degree of activity.

The compound powder of scammony in the last edition of the London pharmacopœia differed considerably from the present: For there, the only addition was calcined hartshorn, intended merely for the division of the scammony. This purpose is still better answered by the crystals of tartar, which at the same time conspire with the operation of the scammony as a purgative. But the addition of jalap and ginger, according to the present formula of the London pharmacopœia, gives not only a purgative considerably different, but increases also the heating quality of the medicine, while the cream of tartar has an evident refrigerant power. Both may on occasions be useful, but we think that in most cases the Edinburgh formula will be found preferable.

In editions of our pharmacopœias of still older date, this powder was prepared with another very active ingredient, diaphoretic antimony. It was much celebrated as distinguished by the name of its inventor, being called from its first publisher, *Cornachini's powder*. In a former edition of the Edinburgh pharmacopœia it was thus directed to be prepared:

Take of diaphoretic antimony, cream of tartar, scammony, each equal parts. Make them into a powder.

This may be given to the quantity of a dram or more. In other prescriptions, the tartar and antimonial calx bear nearly the same proportion to the scammony as the calcined hartshorn did in the London pharmacopœia. It appears probable, that neither of these ingredients are of any farther use, than as they divide the texture of the scammony; though Cornachini supposes very considerable advantage from some deobstruent quality in the tartar, whereby the vessels shall be opened, and the noxious humours prepared for expulsion; and from the preparation of antimony, though it have no sensible operation, he expects some share of the same success which sometimes attends the rougher preparations of that mineral.

Both the present formulæ may, however, be considered as possessing all the advantages of Cornachini's powder.

Powder of scammony with aloes. L.

544 Take of scammony, six drams; hard extract of jalap, socotorine aloes, of each an ounce and an half; ginger, half an ounce. Powder them separately, and mix them.

In this formula, the combination of scammony, jalap, and aloes, furnishes a very active purgative, which, with some intentions at least, may be preferable to either of the preceding. Taken from five to ten grains, it will operate as a purgative, even in cases of obstinate costiveness.

Powder of scammony with calomel. L.

545 Take of scammony, half an ounce; calomel, double,

refined sugar, of each two drams. Rub them separately to a powder, and then mix them.

In this formula, we have the scammony in a more simple state, united with such a proportion of calomel as must very considerably aid its purgative power. And accordingly it may be employed with advantage, both in cases of obstinate costiveness and in dropical affections, where a considerable discharge is required from the system.

Compound powder of senna. L.

Take senna, crystals of tartar, of each two ounces; scammony, half an ounce; ginger, two drams. Rub the scammony by itself, rub the rest together into a powder, and then mix them all.

This powder is given as a cathartic, in the dose of two scruples or a dram. The spice is added, not only to divide, but to warm the medicine, and make it sit easier on the stomach. The scammony is used as a stimulus to the senna; the quantity of the latter necessary for a dose, when not assisted by some more powerful material, being too bulky to be conveniently taken in this form.

The composition of this medicine is now considerably simplified by the rejection both of cinnamon and cloves, as the ginger alone is found fully to answer the intention in view.

Styptic powder. E.

Take of alum, an ounce and an half; gum-kino, three drams. Grind them together into a fine powder.

In former editions of our pharmacopœia, a powder of this kind was directed to be made with alum and dragon's blood, and was long in repute as an astringent, under the title of *Helvetius's styptic powder*. The gum-kino is judiciously substituted for the dragon's blood, as being a much more powerful and certain astringent. The chief use of this powder is in hæmorrhagies, especially of the uterus.

Compound powder of tragacanth. L.

Take of tragacanth powdered, gum-arabic, starch, each an ounce and a half; double-refined sugar, three ounces. Rub them together into a powder.

This composition is somewhat simplified by the rejection of the marshmallow, and liquorice-root, which formerly entered it. But this has not probably produced any diminution of its medical properties. It operates as a mild emollient; and hence becomes serviceable in hectic cases, tickling coughs, strangury, some kinds of alvine fluxes, and other disorders proceeding from a thin acrimonious state of the humours, or an abrasion of the mucus of the intestines; they soften, and give a greater degree of consistency to the former, and defend the latter from being irritated or excoriated by them. All the ingredients coincide in these general intentions. The dose is from half a dram to two or three drams, which may be frequently repeated.

Anthelmintic powder. Gen.

Take of the flowers of tansy, worm-seeds, each three drams; sal martis, one dram. Mix them.

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Both the tanfy and worm-feed poffefs a confiderable degree of anthelmintic power, which is not a little increafed by the falt of fteel. And from this combination more effect in the expulfion of worms, particularly of the lumbrici, may be expected, than from any of the articles taken by themfelves. This powder may be taken to the extent of half a dram or upwards for a dofe, proportioned to the age and circumftances of the patient.

Powder againft the bite of a mad dog. Brun.

350 Take of afh-coloured ground liverwort, two ounces; black pepper, one ounce. Beat them together into a powder.

The virtue for which this medicine has been celebrated, is expreffed in its title; the dofe is a dram and a half, to be taken in the morning fafting, in half a pint of cows milk warm, for four mornings together.

At one period it was held, on the recommendation of Dr Mead and other eminent practitioners, in very high efteem. Now, however, it has fallen into fuch difrepute, as to be banifhed from moft of the modern pharmacopœias.

Compound powder of arum. Suec.

351 Take of arum root, fresh dried, two drams; yellow water-flag roots, burnt faxifrage roots, each one dram; white canella, a dram; falt of wormwood, one fcruple. Beat them into a powder, which is to be kept in a clofe vefel.

In former editions of the London pharmacopœia, one of the ingredients in this compofition was called *acorus vulgi* or *vulgaris*; a name which has been applied, by different writers, both to *calamus aromaticus*, and to *gladiolus luteus*, or common yellow water-flag. In this uncertainty, the compounders generally took the former. But as the medicine was firft contrived by a German phyfician (Birkmann), and as in fome of the German pharmacopœias, the *acorus vulgaris* is explained to be the water-flag, the Swedifh college have rather, in conformity to the original prefcription, than from any opinion of the virtues of the water-flag (which appears, when the root is dried and powdered, to be very inconfiderable), made choice of this laft, and expreffed it by the name which more clearly diftinguifhes it from the other. The caution of keeping the powder in a clofe vefel is very neceffary; for if it be expofed to the air, the alkaline falt, imbibing moiſture, would run into a liquid ſtate. Two alkaline falts have been generally directed; but as they differ from each other only in name, one of them is here juſtly omitted, and fupplied by a proportional increafe of the other. Crabs eyes were originally an article in this compofition, but probably ſerved little other purpoſe than to increaſe its volume.

Agreeably to the above remark, the college of Edinburgh, in a reviſal of their pharmacopœia, had omitted the crabs-eyes, and continued the former practice of uſing *calamus aromaticus* for the *acorus vulgaris*. They had likewiſe exchanged the cinnamon for the white canella; and the alkaline falt for a neutral one, better ſuited to the form of a powder. Their formula was as follows:

Take of arum roots, newly dried, two ounces; *calamus aromaticus*, burnt faxifrage roots, each one ounce; white canella, fix drams; vitriolated tartar, two drams. Mix and make them into a powder.

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This article, which had formerly a place alſo in the London pharmacopœia, is ſtill retained in ſome of the beſt foreign ones: But it is now altogether rejected from our pharmacopœias.

The compound powder of arum was originally intended as a ſtomachic: and in weakneſſes and relaxations of the ſtomach, accompanied with a ſurcharge of viſcid humours, it is doubtleſs a very uſeful medicine. It frequently has alſo good effects in rheumatic caſes: the doſe may be from a ſcruple to a dram, two or three times a day, in any convenient liquor. It ſhould be uſed as freſh as poſſible, for its virtue ſuffers greatly in keeping: the arum root in particular, its capital ingredient, ſoon loſes the pungency, in which its efficacy principally conſiſts.

Digeflive powder. Suec.

Take of bitter purging ſalts, rhubarb, each equal parts. Mix them. 552

In this compoſition, the falt will brifken the operation of the rhubarb as a cathartic, and the aſtringency of the latter will tend to increaſe the tone of the ſtomach: hence, in conſequence of evacuating, and at the ſame time ſtrengthening the alimentary canal, it may be preſumed to have conſiderable influence in promoting digeſtion.

Dyſenteric powder. Dan.

Take of rhubarb, one ounce; calcined hartſhorn, half an ounce; gum-arabic, three drams; caſcarilla bark, two drams. Mix them, and reduce them to a very fine powder. 553

Here the rhubarb is combined with another powerful tonic, the caſcarilla; and while the calcined hartſhorn ſerves to neutralize acid, the gum-arabic will operate as a demulcent. This compoſition therefore may be very uſeful in dyſenteric caſes, after the violence of the diſeaſe has been overcome, and when there remains a debilitated and abraded ſtate of the inteſtinal canal.

Fumigation powder. Roſſ.

Take of olibanum, amber, maſtich, each three parts; ſtorax, two parts; benzoin, labdanum, each one part. Mix them into a groſs powder. 554

This powder is intended for the purpoſe of fumigation; and when burnt it gives out a fragrant odour: hence it may be ſucceſſfully employed for combating diſagreeable ſmells, and counteracting putrid or other noxious vapours diffuſed in the atmosphere.

Powder for infants. Suec.

Take of magnesia alba, one ounce; rhubarb, reduced to a very fine powder, one dram. Let them be mixed. 555

This powder is very uſeful for deſtroying acid, and at the ſame time reſtoring the diminiſhed tone of the alimentary canal: hence it is often advantageouſly employed in caſes of diarrhœa, which depend on theſe morbid

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morbid conditions. And it is in general a circumstance of considerable advantage, that it does not tend to check looseness very suddenly. It is particularly useful with infants, and hence the origin of the name here affixed to it.

Nitrous powder. Succ.

- 556 Take of purified nitre, three ounces; salt of sorrel, one ounce; double-refined sugar, ten ounces. Let them be mixed.

This is a very convenient and agreeable form of exhibiting nitre: for while the sugar serves not only to divide and diffuse it, but also to correct its taste, the salt of sorrel adds to its refrigerant power.

Purging Peruvian powder. Gen.

- 557 Take of the powder of Peruvian bark, one ounce; powder of rhubarb, powder of sal ammoniac, each one dram and a half.

It has been imagined by many, that particular advantage resulted from uniting the Peruvian bark with sal ammoniac; and there can be no doubt, that in some cases inconvenience results from the bark, in consequence of its binding the belly. There are therefore circumstances in which the combination here proposed may perhaps be proper: but there is reason to believe that the benefit of the sal ammoniac is more imaginary than real; and it not unfrequently happens, that we are disappointed of the benefit which might otherwise be derived from the bark, in consequence of its proving even of itself a purgative. Hence, in perhaps a majority of cases, the exhibiting it with the additions here proposed will be rather prejudicial than otherwise.

Thebaic powder. Succ.

- 558 Take of opium, half a scruple; purified nitre, five scruples and a half; refined sugar, one ounce. Mix them together into a powder.

In this powder those inconveniences which sometimes result from opium may with certain constitutions be corrected, in consequence of the refrigerant power of nitre; and hence it may prove a very useful sedative powder. The sugar is intended merely to give form to the medicine; and in its state of combination, each dram of it contains a grain of opium; so that a practitioner has it in his power easily to regulate the dose according to circumstances.

Sponge-powder. Gen.

- 559 Take of burnt sponge, powdered, common salt, each three drams. Mix them, and divide into twelve powders.

We have formerly noticed the manner of burning sponge, (see n° 98.) It is of very considerable service in scrofulous affections, and particularly in the cure of the bronchocele. It has of late been highly celebrated for these purposes by Mr Wilmer, under the title of the *Coventry remedy*. There it was sometimes employed merely in its pure state, combined with a sufficient quantity of honey, to form it into a bolus; sometimes it was given united with calcined cork and pumice-stone. What advantage,

however, it could have derived from these additions it is difficult to conceive; nor can we readily see how it will be improved by the addition of common sea-salt here proposed: for this may probably lead to new combinations, materially altering the qualities of those salts which the sponge itself contains; and on which its virtues, as far as it has any, must depend. At the same time, for any experience which we ourselves have had, we are inclined to think, that those virtues which have been attributed to burnt sponge are more imaginary than real.

CHAP. XXVI. *Troches.*

TROCHES and lozenges are composed of powders made up with glutinous substances into little cakes, and afterwards dried. This form is principally used for the more commodious exhibition of certain medicines, by fitting them to dissolve slowly in the mouth, so as to pass by degrees into the stomach; and hence these preparations have generally a considerable proportion of sugar or other materials grateful to the palate. Some powders have likewise been reduced into troches, with a view to their preparation; though possibly for no very good reasons: for the moistening, and afterwards drying them in the air, must on this account be of greater injury than any advantage accruing from this form can counterbalance.

General Rules for making Troches.

1. The three first rules laid down for making powders, are also to be observed in the powders for troches.
2. If the mass proves so glutinous as to stick to the fingers in making up, the hands may be anointed with any convenient sweet or aromatic oil; or else sprinkled with powder of starch, or of liquorice, or with flour.
3. In order to thoroughly dry the troches, put them on an inverted sieve, in a shady airy place, and frequently turn them.
4. Troches are to be kept in glass vessels, or in earthen ones well glazed.

Troches of starch. L.

Take of starch, an ounce and an half; liquorice, six drams; florentine orris, half an ounce; double refined sugar, one pound and a half. Rub these to powder, and, by the help of tragacanth, dissolved in water, make troches. They may be made, if so chosen, without the orris.

White pectoral troches. E.

Take of purest sugar, one pound; gum arabic, four ounces; starch, one ounce; flowers of benzoin, half a dram. Having beat them all into a powder, make them into a proper mass with rose-water, so as to form troches.

These compositions are very agreeable pectorals, and may be used at pleasure. They are calculated for softening acrimonious humours, and allaying the tickling in the throat which provokes coughing.

Although not only the name but the composition

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also in the London and Edinburgh pharmacopœias be somewhat different, yet their effects are very much the same.

Troches of liquorice. L.

- 562 Take of extract of liquorice, double-refined sugar, each ten ounces; tragacanth, powdered, three ounces. Make troches by adding water.

Black pectoral troches. E.

Take of extract of liquorice, gum arabic, each four ounces; white sugar, eight ounces. Dissolve them in warm water, and strain: then evaporate the mixture over a gentle fire till it be of a proper consistence for being formed into troches.

These compositions are designed for the same purposes as the white pectoral troches above described. In foreign pharmacopœias there are some other troches of this kind, under the titles of *Trochisci bechici flavi* and *rubri*; the first are coloured with saffron, the latter with bole armenic. The dissolving and straining the extract of liquorice and gum arabic, as now ordered in the last of the above prescriptions, is a considerable improvement; not only as they are by that means more uniformly mixed than they can well be by beating, but likewise as they are thereby purified from the heterogeneous matters, of which both those drugs have commonly no small admixture.

Pectoral troches with opium. E.

- 563 Take of pure opium, two drams; balsam of Peru, one dram; tincture of Tolu, three drams. Grind the opium with the balsam and tincture previously mixed, till it be thoroughly dissolved; then add by degrees, of common syrup, eight ounces; extract of liquorice, softened in warm water, five ounces. While beating them diligently, gradually sprinkle upon the mixture five ounces of powdered gum arabic. Exsiccate so as to form troches, each weighing ten grains.

The directions for preparing the above troches are so full and particular, that no farther explanation is necessary. Six of the troches prepared in the manner here ordered, contain about one grain of opium. These troches are medicines of approved efficacy in tickling coughs depending on an irritation of the fauces. Besides the mechanical effect of the inviscating matters and involving acrid humours, or lining and defending the tender membranes, the opium must, no doubt, have a considerable share, by more immediately diminishing the irritability of the parts themselves.

The composition of these troches, however, would perhaps be improved by the omission of the balsam of Peru: for although here directed only in small quantity, yet it gives a taste to the troches which is to many people very disagreeable; and it is at the same time probable that it adds very little, if any thing, to the efficacy of the medicine.

Troches of nitre.

- 564 Take of purified nitre, powdered, four ounces; double-refined sugar, powdered, one pound; tragacanth,

powdered, six ounces. With the addition of water, make troches. *L.*

Take of nitre, purified, three ounces; double-refined sugar, nine ounces. Make them into troches with mucilage of gum tragacanth. *E.*

This is a very agreeable form for the exhibition of nitre; though, when the salt is thus taken without any liquid (if the quantity be considerable), it is apt to occasion uneasiness about the stomach, which can only be prevented by large dilution with aqueous liquors. The troches of nitre have been said to be employed with success in some cases of difficult deglutition.

Troches of sulphur.

Take of washed flowers of sulphur, two ounces; double-refined sugar, four ounces. Rub them together; and, with the mucilage of quince-seeds, now and then added, make troches. *L.*

Take of flowers of sulphur, two ounces; flowers of benzoin, one scruple; white sugar, four ounces; factitious cinnabar, half a dram. Beat them together, and add mucilage of gum tragacanth as much as is sufficient. Mix and make them into troches according to art. *E.*

These compositions are to be considered only as agreeable forms for the exhibition of sulphur, no alteration or addition being here made to its virtues; unless that, by the flowers of benzoin in the second prescription, the medicine is supposed to be rendered more efficacious as a pectoral.

The factitious cinnabar seems chiefly intended as a colouring ingredient.

Troches of chalk. L.

Take of chalk, prepared, four ounces; crabs-claws, prepared, two ounces; cinnamon, half an ounce; double-refined sugar, three ounces. These being rubbed to powder, add mucilage of gum arabic, and make troches.

Troches of magnesia. L.

Take of burnt magnesia, four ounces; double-refined sugar, two ounces; ginger, powdered, one scruple. With the addition of mucilage of gum arabic make troches.

These compositions are calculated against that uneasy sensation at the stomach, improperly called the heartburn; in which they often give immediate relief, by absorbing and neutralizing the acid juices that occasion this disorder. The absorbent powders here used are of the most powerful kind. The former has in general the effect of binding, the latter of opening, the belly; and from this circumstance the practitioner will be determined in his choice, according to the nature of the case which he may have occasion to treat.

Red lead troches. Dan.

Take of red lead, half an ounce; corrosive sublimate mercury, one ounce; crumb of the finest bread four ounces. Make them up with rose-water into oblong troches.

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These troches are employed only for external purposes as escarotics: they are powerfully such, and require a good deal of caution in their use.

Troches of catechu. Brun.

568 Take of catechu, one ounce; white sugarcandy, two ounces; ambergris, musk, each ten grains; mucilage of gum tragacanth, as much as is sufficient. Make them into troches.

This medicine has long been in esteem as a slight refringent; and refringents thus gradually received into the stomach produce better effects than when an equal quantity is taken down at once. These troches would be more palatable, and perhaps not less serviceable, were the musk and ambergris omitted.

CHAP. XXVII. *Pills.*

569 To this form are peculiarly adapted those drugs which operate in a small dose, and whose nauseous and offensive taste or smell require them to be concealed from the palate.

Pills dissolve the most difficultly in the stomach, and produce the most gradual and lasting effects of all the internal forms. This is in some cases of great advantage, in others it is a quality not at all desirable; and sometimes may even be of dangerous consequence, particularly with regard to emetics; which, if they pass the stomach undissolved, and afterwards exert themselves in the intestines, operate there as violent cathartics. Hence emetics are among us scarcely ever given in pills; and hence to the resinous and difficultly soluble substances, saponaceous ones ought to be added, in order to promote their solution.

Gummy resins, and inspissated juices, are sometimes soft enough to be made into pills without addition: where any moisture is requisite, spirit of wine is more proper than syrups or conserves, as it unites more readily with them, and does not sensibly increase their bulk. Light dry powders require syrup or mucilages; and the more ponderous, as the mercurial and other metallic preparations, thick honey, conserve or extracts.

Light powders require about half their weight of syrup, of honey, about three-fourths their weight, to reduce them into a due consistence for forming pills. Half a dram of the mass will make six or seven pills of a moderate size.

General Rules for making pills.

1. Gums and inspissated juices are to be first softened with the liquid prescribed; then add the powders, and continue beating them all together till they be perfectly mixed.
2. The masses for pills are best kept in bladders, which should be moistened now and then with some of the same kind of liquid that the mass was made up with, or with some proper aromatic oil.

Ethiopic pills. E.

570 Take of quicksilver, six drams; golden sulphur of antimony, resin of guaiacum, honey, each half an ounce. Grind the quicksilver with the honey, in a glass

mortar, until the mercurial globules entirely disappear; then add the golden sulphur and guaiacum, with as much mucilage of gum arabic as is sufficient to make the mixture into a mass of the proper consistence for forming pills.

These pills are much more efficacious than those of a former edition; the ethiops mineral, there ordered, being exchanged for a more active composition. In their present form, they resemble Dr Plummer's pills, described in the Edinburgh Essays, and afterwards to be mentioned. To it they are preferable in one respect, that they are less apt to run off by stool. They are an useful alterative both in cutaneous and venereal disorders. One fourth-part of the quantity above prescribed may be made into sixty pills; of which from one to four may be taken every night and morning, the patient keeping moderately warm during the whole time that this course is continued.

Pills of aloes. L.

571 Take of socotorine aloes, powdered, one ounce; extract of gentian, half an ounce; syrup of ginger, as much as is sufficient. Beat them together.

Aloetic pills. E.

Take of socotorine aloes, in powder, thick extract of gentian, each two ounces; make them into a mass with simple syrup.

These pills were formerly directed to be made with Castile soap; from a notion which Boerhaave and some others were very fond of, that soap promoted the solution of resinous and several other substances in the stomach. This, however, seems to be a mistake; and, on the contrary, it is highly probable that the alkaline part of the soap is in most instances separated from the oily by the acid in the stomach; by which decomposition the soap may possibly retard instead of promoting the solution of the aloes. These pills have been much used as warming and stomachic laxatives: they are very well suited for the costiveness so often attendant on people of sedentary lives. Like other preparations of aloes, they are also used in jaundice, and in certain cases of obstructed menses. They are seldom used for producing full purging; but if this be required, a scruple or half a dram of the mass may be made into pills of a moderate size for one dose.

Pills of aloes with myrrh. L.

572 Take of socotorine aloes, two ounces; myrrh, saffron, of each one ounce; syrup of saffron, as much as is sufficient. Rub the aloes and myrrh separately to powder; afterwards beat them all together.

The common pills, vulgarly called Rufus's pills. E.

Take of socotorine aloes, two ounces; myrrh, one ounce; saffron, half an ounce. Beat them into a mass with a proper quantity of syrup.

These pills have long continued in practice, without any other alteration than in the syrup with which the mass is made up, and in the proportion of saffron. In our last pharmacopœia, the syrup of wormwood was ordered, which is here judiciously exchanged by the London college for that of saffron; this preserving and

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and improving the brightness of colour in the medicine, which is the characteristic of its goodness. The saffron, in the composition which is attributed to Rufus, is equal in quantity to the myrrh; and in these proportions the pill was received in our first pharmacopœia. As the diminution afterwards made in the saffron was grounded on very absurd reasons, (viz. "left the former quantity should occasion a spasmus cynicus,") the London college have now again increased it, and restored the pill to its original form. The virtues of this medicine may be easily understood from its ingredients. These pills, given to the quantity of half a dram or two scruples, prove considerably cathartic, but they answer much better purposes in smaller doses as laxatives or alteratives.

Colocynth pills with aloes, commonly called Coccia. E.

573 Take socotorine aloes, scammony, of each two ounces; sal polychrest, two drams; colocynth, one ounce; oil of cloves, two drams. Reduce the aloes and scammony into a powder with the salt; then let the colocynth, beat into a very fine powder, and the oil be added; lastly, make it into a proper mass with mucilage of gum arabic.

In these pills we have a very useful and active purgative; and where the simple aloetic pill is not sufficient for obviating costiveness, this will often effectually answer the purpose. Little of their activity can depend upon the salt which enters the composition; but it may assist in dividing the active parts of the other articles, particularly the aloes and scammony. These pills often produce a copious discharge in cases of obstinate costiveness, when taken to the extent only of five or ten grains; but they may be employed in much larger doses. They are, however, seldom used with the view of producing proper catharsis. Half a dram of the mass contains about five grains of the colocynth, ten of the aloes, and ten of the scammony.

Copper pills. E.

574 Take of cuprum ammoniacum, sixteen grains; crumb of bread, four scruples; spirit of sal ammoniac, as much as is sufficient to form them into a mass, which is to be divided into thirty-two equal pills.

These pills had formerly the name of *Pilula cerulea*, but they are now with greater propriety denominated from the metal which is their basis.

Each of these pills weigh about three grains, and contain somewhat more than half a grain of the cuprum ammoniacum. The above pills seem to be the best form of exhibiting this medicine. See *CUPRUM AMMONIACALE*, and CHEMISTRY, no 1034.

Gum pills.

575 Take of galbanum, opopanax, myrrh, sagapenum, each one ounce; asafœtida, half an ounce; syrup of saffron, as much as is sufficient. Beat them together. *L.*

Take of asafœtida, galbanum, myrrh, each one ounce; rectified oil of amber, one dram. Beat them into a mass with simple syrup. *E.*

These pills are designed for antihysterics and emme-

nagogues, and are very well calculated for answering those intentions; half a scruple, a scruple, or more, may be taken every night or oftener. The fetid pills of our former pharmacopœia were considerably purgative: the purgative ingredients are now omitted, as the physician may easily, in extemporaneous prescription, compound these pills with cathartic medicines, in such proportions as particular cases shall require.

Quicksilver pills. L.

Take purified quicksilver, extract of liquorice, having the consistence of honey, of each two drams; liquorice, finely powdered, one dram. Rub the quicksilver with the extract of liquorice until the globules disappear; then, adding the liquorice-powder, mix them together.

Mercurial pills. E.

Take of quicksilver, honey, each one ounce; crumb of bread, two ounces. Grind the quicksilver with the honey in a glass mortar till the globules disappear, adding occasionally a little simple syrup; then add the crumb of bread, and beat the whole with water into a mass, which is to be immediately divided into four hundred and eighty equal pills.

The quicksilver was formerly directed to be ground with resin of guaiacum and Castile soap. The former was supposed to coincide with the virtues of the mercury, and the latter was used chiefly to divide the globules of mercury. For this last intention Dr Saunders found that honey, the substance here ordered by the Edinburgh college, is of all he tried the most effectual: but we would suppose with this gentleman, that something farther is done in this process than the mere division of the mercurial globules, and that part of the quicksilver is as it were amalgamated with the honey, or brought to a state similar to that in Plenck's solution. The same effect will take place when the pills are prepared with extract of liquorice now directed by the London college.

The mercurial pill is one of the best preparations of mercury, and may in general supersede most other forms of this medicine. It is necessary to form the mass immediately into pills, as the crumb soon becomes too hard for that purpose. Soap was undoubtedly a very improper medium for triturating the mercury; it is not only too hard for that purpose, but when the preparation entered the stomach, the alkaline part of the soap being engaged by the acid in that viscus, the mercury would in all probability be immediately separated. The honey and bread can only be changed by the natural powers of digestion, and can never oppress the stomach. The dose of the pills is from two to four or six in the day, according to the effects we wish to produce.

Jalap pills. E.

Take of extract of jalap, two ounces; aromatic powder, half an ounce. Beat them into a mass with simple syrup.

This is an useful and active purgative, either for evacuating the contents of the intestinal canal, or producing a discharge from the system in general.

One of the same kind, with powdered jalap in substance instead of the extract, is used in some of our hospitals, as a cheap and effectual purge.

Plummer's pill. E.

- 578 Take of sweet mercury, precipitated sulphur of antimony, each six drams; extract of gentian, white Spanish soap, each two drams. Let the mercury be triturated with the sulphur till they be thoroughly mixed, then add the extract, and form a mass with simple syrup.

These pills were recommended to the attention of the public about forty years ago by Dr Plummer, whose name they still bear. He represented them in a paper which he published in the Edinburgh Medical Essays, as a very useful alterative; and on his authority they were at one time much employed; but they are now less extensively used than formerly. And although they still retain a place in the Edinburgh pharmacopœia, yet it is probable that every purpose to be answered by them may be more effectually obtained from the common mercurial pill, or from calomel in a more simple state.

Opium pills. L.

- 579 Take of hard purified opium, powdered, two drams; extract of liquorice, one ounce. Beat them until they are perfectly united.

Thebaic, commonly called Pacific pills. E.

Take of opium, half an ounce; extract of liquorice, two ounces; Castile soap, an ounce and a half; Jamaica pepper, one ounce. Soften the opium and extract separately with proof-spirit, and having beat them into a pulp, mix them; then add the soap, and the pepper beat into a powder; and lastly, having beat them well together, form the whole into a mass.

These two compositions, though differing in several particulars, may yet be considered as fundamentally very much the same. The first is a simple opiate, in which every five grains of the mass contains one of opium; and in the opium alone can we suppose that the activity of the medicine depends.

Although some of the articles contained in the latter composition may perhaps be supposed to operate as corrigentia, yet the former composition, which is the most simple, is in general preferable.

Pills similar to the second were contrived by a chemical empiric, Starkey, and communicated by him to Matthews, under whose name they were some time ago greatly celebrated. The form here given differs considerably from the original, in omitting many ingredients of no great service. Nor indeed are any of the ingredients of much consequence, except the opium; their quantity being too inconsiderable to answer any useful purpose. Ten grains of the composition contain one of opium.

Squill-pills.

- 580 Take of fresh dried squills, powdered, one dram; ginger powdered, soap, of each three drams; ammoniacum, two drams; syrup of ginger, as much as is sufficient. Beat them together. *E.*

Take of gum ammoniac, lesser cardamom seeds, in powder, extract of liquorice, each one dram; dried root of squills, in fine powder, one scruple. Mix and form them into a mass with simple syrup. *E.*

These are elegant and commodious forms for the exhibition of squills, whether for promoting expectoration, or with the other intentions to which that medicine is applied. As the virtue of the compound is chiefly from the squills, the other ingredients are often varied in extemporaneous prescription: and probably no material difference takes place in the two forms here proposed excepting in the proportion of the squills, which in the former constitutes one ninth, in the latter one tenth, of the mass.

Stomachic pills. E.

Take of rhubarb, one ounce; socotorine aloes, six drams; myrrh, half an ounce; vitriolated tartar, one dram; essential oil of mint, half a dram; syrup of orange peel, a sufficient quantity. Make them into a mass.

This pill is intended for moderately warming and strengthening the stomach, and evacuating crude viscid humours. A scruple of the mass may be taken twice a-day.

Bacher's pill. Gen.

Take of extract of black hellebore, purified myrrh, each one ounce; powder of carduus benedictus, two scruples. Mix them into a mass according to art, to be dried in the air till it be fit for the formation of pills, each weighing one grain.

These pills have been strongly recommended as a most effectual remedy in dropical cases, and have been alleged to unite an evacuant and tonic power. Hence they have been considered as particularly suited to those cases where remarkable weakness and laxity occur. Under the hands of Mr Bacher the inventor, they acquired so great reputation, that, after a trial in the military hospitals at Paris, the receipt was purchased by the French king, and published by authority. But like many other nostrums since this publication, Bacher's pill has by no means supported the reputation which it had when kept a secret. The dose is varied according to circumstances, from one to thirty pills taken in the course of the day.

Pills of elaterium. Suec.

Take of the purest gum ammoniac, two ounces; socotorine aloes, gamboge, each two drams; elaterium, half a dram. Mix them, by means of bitter tincture, into a mass, and let pills be formed, each weighing two grains.

This, as well as the former, is also a pill celebrated for the cure of dropical affections. And the elaterium, from which it derives its name, is one of the most powerful evacuants in the way of catharsis. Here, however, it is united with such active articles, particularly the gamboge, as must make its effect somewhat doubtful. And we are inclined to think that a preferable formula for making the pills of elaterium, is to form it into a mass, with the extract of gentian. This is imagined to have some influence as correcting its effect,

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in exciting sickness. And when each pill is made to contain half a grain of the elaterium, the dose may be easily accommodated to the circumstances of the patient, one or two pills being taken every hour till they begin to operate.

The elaterium, whether under the form above-mentioned, or in the more simple state which has now been suggested, operates as a very powerful cathartic, often inducing the discharge of stagnant serum, when other remedies are found ineffectual. But it can be exhibited only in those cases where the patient still retains a considerable degree of strength.

Fetid pills. Suec.

- 584 Take of asafœtida, castor, each a dram and a half; salt of amber, half a dram; oil of hartshorn, half a scruple. Make them into a mass, with tincture of myrrh, to be divided into pills of two grains each.

These, like the gum-pills formerly mentioned, are chiefly used as an antihysterical and antispasmodic medicine; and they are particularly useful in counteracting spasmodic affections of the alimentary canal, especially those connected with flatulence. But the asafœtida is no less successful when exhibited in a more simple state, particularly when formed into pills with an equal quantity of soap, by the aid of simple syrup.

Gamboge pills. Dan.

- 585 Take of socotorine aloes, extract of black hellebore, sweet mercury, gamboge, each two drams; distilled oil of juniper, half a dram; syrup of buckthorn, as much as is sufficient for forming a mass of pills.

From the ingredients of which these pills are constituted, we need hardly remark, that they must prove a very powerful purgative. The gamboge, from which they derive their name is unquestionably a very active purge. But it is not more so than the sweet mercury; and perhaps from an union of these two, as much might be expected as from the more compounded formula here adopted. Yet it is not improbable that the essential oil of juniper may in some degree operate as a corrigent.

Pills of corrosive sublimate mercury. Suec.

- 586 Take of corrosive sublimate, purified sal ammoniac, each one scruple; distilled water, as much as is sufficient to dissolve them; powder of the root of althea, sixteen scruples; honey, two drams. Mix them into a mass for the formation of pills, each weighing three grains.

Corrosive sublimate in substance was long considered as being so violent in its effects, that it could not with safety be taken internally; but for a considerable time it has been used with advantage under the form of solution, either in water or spirits. But to both these a considerable objection occurs from their disagreeable brassy taste. This objection is however entirely obviated, by reducing the solution, after it is formed, to a solid mass, by means of crumb of bread, or any proper powder: and by the aid of a little sal ammoniac, the solution may be made in a very small quantity of water; so that less of any solid in-

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tar medium will be sufficient to bring it to the form of pills. The formula here directed seems well suited for the purpose intended. Each of the pills contains about an eighth of a grain of the corrosive; thus the dose may be easily regulated according to the intention in view. And these pills are not unfrequently employed with advantage, both in combating venereal and cutaneous affections, and for the expulsion of worms from the alimentary canal. With the latter of these intentions, a similar pill was particularly recommended by Dr Gardner, in a paper published in the Edinburgh Physical and Literary Essays: and although not received into our pharmacopœia, it has been frequently used at Edinburgh.

Tar pills. Dan.

- Take any quantity of tar, and mix with it as much powdered elecampane root as will reduce it to a proper thickness for being formed into pills.

The powder here mixed with the tar, though of no great virtue, is nevertheless a very useful addition, not only for procuring it a due consistence, but likewise as it divides the resinous texture of the tar, and thus contributes to promote its solution by the animal juices. In the Edinburgh infirmary, half a dram of the mass, made into middle-sized pills, is given every morning and evening in disorders of the breast, scurvy, &c.

Soap pills. Suec.

- Take of hard white soap, two ounces; extract of birch, one ounce. Let them be formed into a mass, to be divided into pills, each containing three grains.

Although many virtues have been attributed to the birch, yet we are inclined to think, that it here serves little other purpose than to give the form of pills to the soap. And this article, even when taken in small quantity with some constitutions, operates as a gentle laxative. But besides this, it has also been supposed to be highly useful both in cases of jaundice and of calculus. There can, however, be little doubt, that the theories on which it has been inferred that it may be useful in such complaints are not well founded; and we may perhaps add, that the use of it, even to a great extent, is by no means attended with those consequences which were once alleged to arise from it.

Storax pills. Suec.

- Take of strained storax, five scruples; extract of liquorice, three drams; opium, one dram. Let the opium, dissolved in wine, be added to the other ingredients, so as to form a mass of proper consistence, to be made into pills, each weighing three grains.

These pills are principally active in consequence of the opium which they contain. And they are chiefly meant with a view to a slow solution in the stomach, and consequently producing more gradual and lasting effects. One grain of opium is contained in seventeen grains of the mass.

CHAP. XXVIII. *Electuaries.*

ELECTUARIES are composed chiefly of powders mixed up with syrups, &c. into such a consistence that

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the powders may not separate in keeping, that a dose may be easily taken upon the point of a knife, and not prove too stiff to swallow.

Electuaries receive chiefly the milder alterative medicines, and such as are not ungrateful to the palate. The more powerful drugs, as cathartics, emetics, opiates, and the like (except in officinal electuaries to be dispensed by weight), are seldom trusted in this form, on account of the uncertainty of the dose; disgustful ones, acrids, bitters, fetids, cannot be conveniently taken in it; nor is the form of an electuary well fitted for the more ponderous substances, as mercurials, these being apt to subside in keeping, unless the composition be made very stiff.

The lighter powders require thrice their weight of honey, or syrup boiled to the thickness of honey, to make them into the consistence of an electuary; of syrups of the common consistence, twice the weight of the powder is sufficient.

Where the common syrups are employed, it is necessary to add likewise a little conserve, to prevent the compound from drying too soon; electuaries of Peruvian bark, for instance, made up with syrup alone, will often in a day or two grow too dry for taking.

Some powders, especially those of the less grateful kind, are more conveniently made up with mucilage than with syrup, honey, or conserve. The three latter stick about the mouth and fauces, and thus occasion the taste of the medicine to remain for a considerable time; while mucilages pass freely, without leaving any taste in the mouth. A little soft extract of liquorice, joined to the mucilage, renders the composition sufficiently grateful, without the inconveniences of the more adhesive sweets.

The quantity of an electuary, directed at a time, in extemporaneous prescription, varies much according to its constituent parts, but it is rarely less than the size of a nutmeg, or more than two or three ounces.

General rules for making electuaries.

- I. The rules already laid down for decoctions and powders in general, are likewise to be observed in making decoctions and powders for electuaries.
- II. Gums, inspissated juices, and such other substances as are not pulverizable, should be dissolved in the liquor prescribed: then add the powders by little and little, and keep the whole briskly stirring, so as to make an equable and uniform mixture.
- III. Astringent electuaries, and such as have pulps of fruit in their composition, should be prepared only in small quantities at a time: for astringent medicines lose much of their virtue on being kept in this form, and the pulps of fruits are apt to become sour.
- IV. The superfluous moisture of the pulps should be exhaled over a gentle fire, before the other ingredients are added to them.
- V. Electuaries, if they grow dry in keeping, are to be reduced to a due consistence, with the addition of a little Canary wine, and not with syrup or honey: by this means the dose will be the least uncertain; a circumstance deserving particular regard, in those especially which are made up with syrup, and contain a proportion of opium.

Electuary of cassia. L.

Take of the fresh extracted pulp of cassia, half a pound; manna, two ounces; pulp of tamarinds, one ounce; rose-syrup, half a pound. Beat the manna, and dissolve it over a slow fire in the rose-syrup; then add the pulps; and with a continued heat evaporate the whole to the proper thickness of an electuary.

Electuary of cassia, commonly called diacassia. E.

Take of pulp of cassia fistularis, six ounces; pulp of tamarinds, manna, each an ounce and a half; syrup of pale roses, six ounces. Having beat the manna in a mortar, dissolve it with a gentle heat in the syrup; then add the pulps, and evaporate them with a regularly continued heat to the consistence of an electuary.

These compositions are very convenient officinals, to serve as a basis for purgative electuaries and other similar purposes; as the pulping a small quantity of the fruits, for extemporaneous prescription, is very troublesome. The tamarinds give them a pleasant taste, and do not subject them, as might be expected, to turn sour. After standing for four months, the composition has been found no sourer than when first made. This electuary likewise is usefully taken by itself, to the quantity of two or three drams occasionally, for gently loosening the belly in costive habits.

Electuary of scammony. L.

Take of scammony, in powder, one ounce and an half; cloves, ginger, of each six drams; essential oil of caraway, half a dram; syrup of roses, as much as is sufficient. Mix the spices, powdered together, with the syrup; then add the scammony, and lastly the oil of caraway.

This electuary is a warm brisk purgative. It is a reform of the *electuarium caryocostinum* of our preceding dispensatories; a composition which was greatly complained of, as being inconvenient to take on account of the largeness of its dose. A dram and a half of this, which contains fifteen grains of scammony, is equivalent to half an ounce of the other.

Electuary of senna. L.

Take of senna, eight ounces; figs, one pound; pulp of tamarinds, of cassia, of prunes, each half a pound; coriander seeds, four ounces; liquorice, three ounces; double-refined sugar, two pounds and an half. Powder the senna with the coriander seeds, and sift out ten ounces of the mixed powder. Boil the remainder with the figs and liquorice, in four pints of distilled water, to one half; then press out and strain the liquor. Evaporate this strained liquor to the weight of about a pound and an half; then add the sugar, and make a syrup; add this syrup by degrees to the pulps, and lastly mix in the powder.

Lenitive electuary. E.

Take of pulp of French prunes, one pound; pulp of cassia, pulp of tamarinds, each two ounces and a half; black syrup of sugar, commonly called *molasses*, one pound and a half; senna leaves, in fine powder, four

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four ounces; coriander seeds, in fine powder, half an ounce. Having boiled the pulps with the syrup to the consistence of honey, add the powders, and beat the whole into an electuary.

This electuary, the name of which is with propriety changed by the London college, is now freed from some superfluous ingredients which were left in it at former revisions, viz. polypody root, French mercury leaves, fenugreek seeds, and linseed. Molasses is preferable to either honey or sugar, as it coincides with the intention, and is not only of itself inapt to ferment, but likewise prevents such substances as are this way disposed from running into fermentation.

It is a very convenient laxative, and has long been in common use among practitioners. Taken to the quantity of a nutmeg or more, as occasion may require, it is an excellent laxative for loosening the belly in costive habits.

Japonic electuary, commonly called *Japonic confection*. E.

- 594 Take of Japan earth, four ounces; gum-kino, three ounces; cinnamon, nutmeg, each one ounce; opium diffused in a sufficient quantity of Spanish white wine, one dram and a half; syrup of dried roses, boiled to the consistence of honey, two pounds and a quarter. Mix and form them into an electuary.

The ingredients in this electuary seem extremely well chosen, and are so proportioned to one another, that the quantity of opium is the same as in the dia-cordium of the former pharmacopœias of Edinburgh, viz. one grain in ten scruples. The gum-kino, now substituted for the tormentil root, is an excellent improvement in the formula.

Tin electuary. Brun.

- 595 Take of pure tin, quicksilver, each one ounce. Let them be formed into an amalgam; oyster-shells, prepared, one ounce. Reduce the whole to a powder. Take of this powder, conserve of wormwood, each one ounce, and form an electuary with syrup of mint.

Tin, as we have already had occasion to observe above (n° 312.), has long been celebrated for the expulsion of tœnia; and it is also well known, that in mercury we have one of the most powerful anthelmintics. Such a combination as the present, then, might be supposed well suited for the removal of that animal from the alimentary canal; and accordingly it has been alleged, that this electuary has sometimes succeeded after other remedies have failed. It may be taken twice a-day, to the extent of two or three drams for a dose.

Electuary for the gums. Suec.

- 596 Take of powdered myrrh, three drams; cream of tartar, cochineal, each a dram and a half. Grind them together in a glass mortar; then add melted honey, four ounces; cloves, in powder, one dram.

Myrrh, particularly under the form of tincture, has long been a favourite application to the gums, when in a spongy or ulcerated state. But the spirituous menstruum there employed, although sometimes favouring the intention in view, in other instances occurs as an objection to its use. In these cases, the benefit to be

derived from the myrrh may be obtained from this electuary, which may always be applied with safety, and sometimes with advantage.

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Electuary of manna. Suec.

Take of manna, refined sugar pounded, fennel-water, each two ounces. Strain the mixture, using expression; then add fine powder of the root of florentine orris, one dram; fresh drawn almond oil, one ounce.

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In this electuary we have a gently emollient laxative, which is very useful in those cases where obstipation either arises from indurated feces, or is supported by that cause. But its cathartic powers are by no means considerable.

Nitrous electuary. Gen.

Take of purified nitre, half an ounce; conserve of roses, four ounces. Mix them.

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Under this formula nitre may be introduced to a considerable extent, without giving uneasiness at stomach, while at the same time its refrigerant power is combined with the astringency of the roses. From these circumstances it may be advantageously employed in different cases, but particularly in instances of hæmoptysis.

Terebinthinate electuary. Suec.

Take of spirit of turpentine, half an ounce; honey, one ounce; powder of liquorice, as much as is sufficient for the formation of an electuary.

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Under this form, the oil of turpentine may be introduced with less uneasiness than perhaps under almost any other. And it may thus be employed for different purposes, but particularly with a view to its diuretic power. But it has been especially celebrated for the cure of obstinate rheumatisms, and above all, for that modification of rheumatism which has the name of *ischias*, and which is found in many instances obstinately to resist other modes of cure.

Lenient linctus. Suec.

Take of gum-arabic, bruised, two drams; cherry-water, half an ounce. By trituration in a mortar, mix with them almond oil, fresh drawn, syrup of almonds, each seven ounces.

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In this we have a very agreeable emollient linctus, highly useful in recent catarrhal affections, for lubricating the throat and fauces. It may be taken at pleasure to any extent that the stomach may easily bear.

CHAP. XXIX. Confections.

ALTHOUGH the London college have separated these from electuaries, yet they differ so little, that in most pharmacopœias they are ranked under the same head. And in that of Edinburgh, there are several articles which have promiscuously the name either of *confection* or *electuary*. But as no inconvenience arises from the separation, and as we have followed the order of the London pharmacopœia in other particulars, it would be improper to deviate from it in this.

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Aromatic confection. L.

Take of zedoary, in coarse powder, saffron, of each half a pound; distilled water, three pints. Macerate for twenty-four hours; then press and strain. Reduce the strained liquor, by evaporation, to a pint and a half, to which add the following, rubbed to a very fine powder; compound-powder of crabs-claws, sixteen ounces; cinnamon, nutmegs, of each two ounces; cloves, one ounce; smaller cardamom-seeds, husked, half an ounce; double-refined sugar, two pounds. Make a confection.

This confection is composed of the more unexceptionable ingredients of a composition formerly held in great esteem, and which was called, from its author, *confectio Raleighana*. The original confection was composed of no less than five and twenty particulars; each of which were examined apart, except one, moor-grass, the flower of which is too small to be gathered in sufficient quantity for the general use of the medicine, and the plant is possessed of hurtful qualities, as is experienced in cattle that feed where it grows. In this examination, many of the extracts came out so very nauseous, that it was impossible to retain them, consistent with any regard to the taste of the composition. But some few, of equal efficacy with any of the rest, being of a tolerable taste and flavour, were compounded in different proportions; and when, after many trials, a composition was approved, the quantity of each material, that would yield the proportion of extract which entered that composition, was calculated, and from thence the proportions were collected as now set down: after which the compound extract was made, and found to answer expectation. The London college, in the present edition of their pharmacopœia, have still farther simplified this formula, by rejecting the rosemary, juniper, and cardamoms, which formerly entered it.

The confection, as now reformed, is a sufficiently grateful and moderately warm cordial; and frequently given with that intention, from eight or ten grains to a scruple or upwards, in boluses or draughts. The formula might perhaps be still more simplified without any loss. The crabs-claw powder does not appear to be very necessary, and is inserted rather in compliance with the original formula, than from its contributing any thing to the intention of the medicine; and the following formula of the Edinburgh pharmacopœia seems to us preferable to that of the London, even in its present improved state.

Cordial electuary, commonly called cordial confection. E.

603 Take of conserve of orange-peel, three ounces; preserved nutmegs, an ounce and a half; preserved ginger, six drams; cinnamon, in fine powder, half an ounce; syrup of orange peel, as much as will form the whole into an electuary.

In the above simple and elegant formula, a number of trifling ingredients are rejected, and those substituted in their place are medicines of approved efficacy. We therefore consider this preparation as an useful remedy for the purposes expressed in its title.

Confection of opium. L.

604 Take of hard purified opium, powdered, six drams;

long pepper, ginger, caraway-seeds, of each two ounces; syrup of white poppy, boiled to the consistence of honey, three times the weight of the whole. Mix the purified opium carefully with syrup gently heated; then add the rest, rubbed to powder.

Thebaic electuary. E.

Take of aromatic powder, six ounces; Virginian snake-root, in fine powder, three ounces; opium diffused in a sufficient quantity of Spanish white wine, three drams; clarified honey, thrice the weight of the powders. Mix them, and form an electuary.

These compositions consist of very powerful ingredients, and are doubtless capable of answering every end that can be reasonably expected from the more voluminous *Theriaca* of Andromachus. The London college also had formerly their *Theriaca* composed of the less exceptionable ingredients of Andromachus's. But as these medicines have for a long time been chiefly employed for external purposes, by the way of cataplasm, the London theriaca is now omitted, and its place supplied by a cataplasm composed of a few well-chosen articles, under the name of *cataplasm of cummin*; of which hereafter. For internal use, none of the theriacas are at present so much regarded as they have been heretofore; practitioners having introduced in their room extemporaneous boluses of Virginian snake-root, camphor, contrayerva, and the like; which answer all their intentions, with this advantage, that they may be given either with or without opium; an ingredient which renders the others prejudicial in cases where they might otherwise be proper.

With regard to the quantity of opium in the foregoing compositions, one grain thereof is contained in thirty-six grains of the confection of opium, and in five scruples of the thebaic electuary. The proportion of opium will vary a little, according to the time that they have been kept; their moisture by degrees exhaling, so as to leave the remainder stronger of the opium than an equal weight was at first. A change of this kind is taken notice of by many writers, but falsely attributed to an imaginary fermentative quality of the ingredients; by which they were supposed, from their multiplicity and contrariety, to be continually exalting and improving the virtues of each other.

A good deal of care is requisite in making these compositions, to prevent the waste which is apt to happen in the pounding, and which would render the proportion of opium to the other ingredients precarious. The intention of dissolving the opium in wine, for these and other electuaries, is, that it may be more uniformly mixed with the rest.

These compositions fully supply the place of two articles, which, though long banished from the shops, we shall here subjoin, as examples of the amazing height to which composition in medicine had at one time proceeded.

Mithridate, or the confection of Democrates.

Take of cinnamon, fourteen drams; myrrh, eleven drams; agaric, Indian nard, ginger, saffron, seeds of mithridate mustard, frankincense, chio turpentine, each ten drams; camels hay, costus, or in its stead zedoary, Indian leaf, or in its stead mace, stechas long

long pepper, hartwort seeds, hypocistis, storax strained, opopanax, galbanum strained, opobalsam, or in its stead expressed oil of nutmegs, Russian castor, each one ounce; Poley mountain, scordium, carpobalsam, or in its stead cubebs, white pepper, candy-carrot seed, bdellium strained, each seven drams; Celtic nard, gentian root, dittany of Crete, red roses, Macedonian parsley seed, lesser cardamom seeds husked, sweet fennel seed, gum arabic, opium strained, each five drams; calamus aromaticus, wild valerian root, aniseed, sagapenum strained, each three drams; meum athamanticum, St John's wort, acacia, or in its stead terra Japonica, bellies of skinks, each two drams and a half; clarified honey, thrice the weight of all the other ingredients. Warm the honey, and mix with it the opium dissolved in wine; melt the storax, galbanum, turpentine, and opobalsam (or expressed oil of nutmegs), together in another vessel, continually stirring them about, to prevent their burning; with these so melted, mix the hot honey, at first by spoonfuls, and afterwards in larger quantities at a time; when the whole is grown almost cold, add by degrees the other spices reduced into powder.

Theriaca of Andromachus, or Venice treacle.

Take of troches of squills, half a pound; long pepper, opium strained, vipers dried, each three ounces; cinnamon, opobalsam, or in its stead expressed oil of nutmegs, each two ounces; agaric, Florence orris root, scordium, red roses, navew seeds, extract of liquorice, each an ounce and a half; Indian nard, saffron, amomum, myrrh, costus, or in its stead zedoary, camel's hay, each one ounce; cinquefoil root, rhubarb, ginger, Indian leaf, or in its stead mace, dittany of Crete, horehound leaves, calamint leaves, stechas, black pepper, Macedonian parsley seed, olibanum, chio turpentine, wild valerian root, each six drams; gentian root, Celtic nard, spignel, leaves of Poley mountain, of St John's wort, and of groundpine, germander tops with the seed, carpobalsam, or in its stead cubebs, aniseed, sweet fennel seed, lesser cardamom seeds, husked, seeds of bishop's weed, of hartwort, and of treacle mustard, hypocistis, acacia, or in its stead Japan earth, gum arabic, storax strained, sagapenum strained, terra Lemnia, or in its stead bole armenic, or French bole, green vitriol calcined, each half an ounce; small (or in its stead the long) birthwort root, lesser centaury tops, candy-carrot seed, opopanax, galbanum, strained, Russian castor, Jews pitch, or in its stead white amber prepared, calamus aromaticus, each two drams; clarified honey, thrice the weight of all the other ingredients. Let these ingredients be mixed together, after the same manner as directed in making the mithridate.

These celebrated electuaries are often mentioned by medical writers, and may serve as examples of the wild exuberance of composition which the superstition of former ages brought into vogue. The theriaca is a formation of mithridate made by Andromachus physician to Nero. The mithridate itself is said to have been found in the cabinet of Mithridates king of Pontus. The first publishers of this pompous arcanum were very extravagant in their commendations of its

virtues; the principal of which was made to consist in its being a most powerful preservative against all kinds of venom; whoever took a proper quantity in a morning was insured from being poisoned during that whole day. This was confirmed by the example of its supposed inventor, who, as Celsus informs us, was by its constant use so fortified against the commonly reputed poisons, that none of them would have any effect upon him when he wanted their assistance. But the notions of poisons which prevailed in those ruder ages were manifestly erroneous. Before experience had furnished mankind with a competent knowledge of the powers of simples, they were under perpetual alarms from an apprehension of poisons, and busied themselves in contriving compositions which should counteract their effects, accumulating together all those substances which they imagined to be possessed of any degree of alexipharmac power. Hence proceed the voluminous antidotes which we meet with in the writings of the ancient physicians; yet it does not appear that they were acquainted with any real poison except the cicuta, aconitum, and bites of venomous animals; and for these they knew of no antidote whatever. Even admitting the reality of the poisons, and the efficacy of the several antidotes separately, the compositions could no more answer the purposes expected from them, than the accumulating of all the medicinal simples into one form could make a remedy against all diseases.

Yet notwithstanding the absurdity in the original intention of these medicines, and their enormity in point of composition, as they contain several powerful materials, whose virtues, though greatly prejudiced, yet are not destroyed, by their multiplicity and contrariety; the compounds have been found, from repeated experience, to produce very considerable effects as warm opiate diaphoretics.

These compositions might without doubt be lopt of numerous superfluities without any diminution of their virtues; yet as the effects of them, in their present form, are so well known, so much regard has been paid to ancient authority as not to attempt a reformation of that kind. Although these forms were originally complex, yet subsequent additions had crept into them. Neither the description in verse of the elder Andromachus, nor the prose explanation of the younger, make any mention of the white pepper afterwards added to the theriaca; and the orris root, in the mithridate of our former pharmacopœias, is also a supernumerary ingredient, not warranted by the original: these therefore are rejected. Nor is the asarum in the mithridate grounded on any good authority: the verse it is taken from is mutilated and corrupt; and the word which some, on conjecture only, suppose to have been asarum, others, also on conjecture, choose to read differently. Till some emendation shall be better founded than merely on critical guesses, this single species may be safely passed over without any prejudice to the medicine. None of the ancient descriptions afford any other light in this particular; for they either omit this ingredient, and others also, or abound with additions.

Another innovation on both these medicines also took place. In each of these compositions were found both cinnamon and cassia-lignea; and it is very evident, from

from several parts of Galen's works, that the latter was used by the ancients only on account of the great difficulty of procuring the other; so that to retain the cassia, now that cinnamon is so common, is a blind following of these writers, without any attention to their meaning: the cassia therefore is now rejected, and half the quantity of cinnamom put in its room; which is the proportion that Galen directs to be observed in substituting the one for the other. It is probable that the case is the same with regard to the Celtic and the Indian nard; that the first had a place in these compositions on account of the difficulty of procuring the Indian, for Galen expressly prefers the latter.

There is a material error in regard to the theriaca, which has passed through several editions of our pharmacopœia: this is the substituting the Roman vitriol for the ancient chalcitis, now not certainly known; and, in the catalogue of simples, describing the Roman to be a blue vitriol, whereas the Italian writers are unanimous it is a green vitriol; and were it not, it would not answer to the effects of the chalcitis, which was certainly a chalybeate, and gives the medicine its black colour. What has chiefly occasioned chalcitis to be supposed a cupreous vitriol seems to be its name, derived from χαλκος, copper: but it is to be observed that all vitriols were formerly imagined to proceed from copper, and were named accordingly: the green or martial vitriols are still called by the Germans *kupffer-wasser*, and by us *copperas*. It is probable that the ancient chalcitis was no other than a native martial vitriol, calcined by the heat of those warm climates to a degree of yellowish red or coppery colour; and therefore the common green vitriol, thus calcined by art, very properly supplies its place.

The preparation of these medicines has been somewhat facilitated by omitting the *trochisci cythereos* used in the mithridate, and the *bedychroi* and *viperini* for the theriaca; and inserting their ingredients, after Zwelfer's manner, in the compositions they are intended for. This is done in the theriaca very commodiously; the ingredients in these troches uniting with those in the theriaca itself into unbroken numbers. But to render the numbers equally simple in the mithridate, it was necessary to retrench a few odd grains from some of the articles, and make a small addition to some others. The proportions of the ingredients in the *trochisci cythereos* are adjusted from the original description in Galen, the numbers in our former pharmacopœia being very erroneous.

Both the London and Edinburgh colleges ventured at length to discard these venerable relics. The Edinburgh college at first substituted in their room an elegant and simple form, equivalent to them both in efficacy, under the title of *theriaca Edinensis*, Edinburgh theriaca. In later editions, however, they have entirely banished the name of theriaca from their book, and have put in its place the more elegant composition already mentioned, the *thebaic electuary*.

CHAP. XXX. Medicated Waters.

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WE have already taken notice of many articles which are either dissolved in water, or communicate their virtues to it; and in one sense of the word these

may be called *medicated waters*. Sometimes this impregnation is effected by the aid of heat, sometimes without it; and thus are formed decoctions, infusions, and the like. But among those articles referred to in this chapter, there takes place mere watery solution only, and they are used solely with the intention of acting topically in the way of lotion, injection, or at the utmost of gargarism.

Compound alum-water. L.

Take of alum, vitriolated zinc, each half an ounce; boiling distilled water, two pints. Pour the water on the salts in a glass vessel, and strain.

607

This water was long known in our shops under the title of *aqua aluminosa Bateana*.

Bates directed the salts to be first powdered and melted over the fire: but this is needless trouble, since the melting only evaporates the aqueous parts, which are restored again on the addition of the water. This liquor is used for cleansing and healing ulcers and wounds; and for removing cutaneous eruptions, the part being bathed with it hot three or four times a-day. It is sometimes likewise employed as a collyrium; and as an injection in the gonorrhœa and fluor albus, when not accompanied with virulence.

Styptic water. E.

Take of blue vitriol, alum, each three ounces; water, two pounds. Boil them until the salts be dissolved; then filter the liquor, and add an ounce and an half of vitriolic acid.

608

This water, though made with the blue in place of the white vitriol, cannot be considered as differing very much from the former. It is formed on the styptic recommended by Sydenham for stopping bleeding at the nose, and other external hemorrhagies; for this purpose cloths or doffils are to be dipt in the liquor, and applied to the part.

Water of ammoniated copper. L.

Take of lime-water, one pint; sal ammoniac, one dram. Let them stand together, in a copper vessel, till the ammonia be saturated.

609

Sapphire-coloured water. E.

Take of lime-water, newly made, eight ounces; sal ammoniac, two scruples; verdegris, powdered, four grains. Mix them, and after 24 hours strain the liquor.

This is a much more elegant and convenient method than the preceding.

This water is at present pretty much in use as a detergent of foul and obstinate ulcers, and for taking away specks or films in the eyes. The copper contributes more to its colour than to its medicinal efficacy; for the quantity of the metal dissolved is extremely small.

Compound water of acetated litharge. L.

Take of acetated water of litharge, two drams; distilled water, two pints; proof-spirit, two drams. Mix the spirit with the acetated water of litharge; then add the distilled water.

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This

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This liquor is of the same nature with solutions of sugar of lead, and is analogous to the vegeto-mineral water of Mr Goulard. It is only used externally as a cosmetic against cutaneous eruptions, redness, inflammation, &c. But even here it is alleged that it is not altogether void of danger, and that there are examples of its continued employment having occasioned fundry ill consequences. But at the same time the very frequent use that is made of it with perfect impunity would lead us to conclude that in these observations there must be some mistake.

Water of vitriolated zinc with camphor. L.

- 611 Take of vitriolated zinc, half an ounce; camphorated spirit, half an ounce; boiling water, two pints. Mix, and filter through paper.

This is an improved method of forming the vitriolic camphorated water of the former editions of the London pharmacopœia. It is used externally as a lotion for some ulcers, particularly those in which it is necessary to restrain a great discharge. It is also not unfrequently employed as a collyrium in some cases of ophthalmia, where a large discharge of watery fluid takes place from the eyes, with but little inflammation. But when it is to be applied to this tender organ, it ought, at first at least, to be diluted by the addition of more water.

Vitriolic water. E.

- 612 Take of white vitriol, sixteen grains; water, eight ounces; weak vitriolic acid, sixteen drops. Dissolve the vitriol in the water, and then adding the acid, strain through paper.

Where the eyes are watery or inflamed, this solution of white vitriol is a very useful application. The slighter inflammations will frequently yield to this medicine without any other assistance; in the more violent ones, venesection and cathartics are to be premised to its use.

CHAP. XXXI. *Plasters.*

- 613 PLASTERS are composed chiefly of oily and unctuous substances, united with powders into such a consistence that the compound may remain firm in the cold without sticking to the fingers; that it may be soft and pliable in a low degree of heat, and that by the warmth of the human body it be so tenacious as readily to adhere both to the part on which it is applied and to the substance on which it is spread.

There is, however, a difference in the consistence of plasters, according to the purposes they are to be applied to: thus, such as was intended for the breast and stomach should be very soft and yielding, while those designed for the limbs are made firmer and more adhesive. An ounce of expressed oil, an ounce of yellow wax, and half an ounce of any proper powder, will make a plaster of the first consistence: for a hard one, an ounce more of wax, and half an ounce more of powder, may be added. Plasters may likewise be made of resins, gummy resins, &c. without wax, especially in extemporaneous prescription: for officinals these compositions are less proper, as they soon grow too soft in keeping, and fall flat in a warm air.

It has been supposed, that plasters might be impregnated with the specific virtues of different vegetables, by boiling the recent vegetable with the oil employed for the composition of the plaster. The coction was continued till the herb was almost crisp, with care to prevent the matter from contracting a black colour: after which the liquid was strained off, and set on the fire again, till all the aqueous moisture had exhaled. We have already observed, that this treatment does not communicate to the oils any very valuable qualities, even relative to their use in a fluid state: much less can plasters, made with such oils, receive any considerable efficacy from the herbs.

Calces of lead, boiled with oils, unite with them into a plaster of an excellent consistence, and which makes a proper basis for several other plasters.

In the boiling of these compositions, a quantity of water must be added, to prevent the plaster from burning and growing black. Such water, as it may be necessary to add during the boiling, must be previously made hot; for cold liquor would not only prolong the process, but likewise occasion the matter to explode, and be thrown about with violence, to the great danger of the operator: this accident will equally happen on the addition of hot water, if the plaster be extremely hot.

Ammoniacum plaster with quicksilver. L.

- Take of strained ammoniacum, one pound; purified quicksilver, three ounces; sulphurated oil, one dram, or what is sufficient. Rub the quicksilver with the sulphurated oil until the globules disappear; then add, by little at a time, the melted ammoniacum, and mix them.

This is a very well contrived mercurial plaster. The ammoniacum in general affords a good basis for the application of the mercury. In some cases, however, it is not sufficiently adhesive. But this inconvenience, when it does occur, may be readily remedied by the addition of a small quantity of turpentine.

Plaster of Spanish flies. L.

- Take of Spanish flies, one pound; wax plaster, two pounds; prepared hog's lard, half a pound. Having melted the plaster and lard, a little before they coagulate sprinkle in the flies, reduced to a very fine powder.

Blistering plaster, or epispastic plaster. E.

- Take of hog's lard, yellow wax, white resin, cantharides, each equal weights. Beat the cantharides into a fine powder, and add them to the other ingredients, previously melted, and removed from the fire.

Both these formulæ are very well suited to answer the intention in view, that of exciting blisters; for both are of a proper consistence, and sufficient degree of tenacity, which are here the only requisites. Cantharides of good quality, duly applied to the skin, never fail of producing blisters. When, therefore, the desired effect does not take place, it is to be ascribed to the flies either being faulty at first, or having their activity afterwards destroyed by some accidental circumstance; such as too great heat in forming, in spreading the plaster, or the like. And when due attention is paid

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to these particulars, the simple compositions now introduced answer the purpose better than those compound plasters with mustard-seed, black pepper, vinegar, verdegriis, and the like, which had formerly a place in our pharmacopœias. It is not however improbable, that the pain of blistering-plasters might be considerably diminished by the addition of a portion of opium, without preventing the good effects otherwise to be derived from them.

Wax-plaster.

- 616 Take of yellow wax, prepared mutton-suet, each three pounds; yellow resin, one pound. Melt them together, and strain the mixture whilst it is fluid.

L.

Take of yellow wax, three parts; mutton-suet, white resin, two parts. Melt them together into a plaster; which supplies the place of melilot plaster. *E.*

This plaster had formerly the title of *drawing plaster*, and was chiefly employed as a dressing after blisters, to support some discharge.

It is a very well contrived plaster for that purpose. It is calculated to supply the place of melilot plaster; whose great irritation, when employed for the dressing of blisters, has been continually complained of. This was owing to the large quantity of resin it contained, which is here on that account retrenched. It would seem that, when designed only for dressing blisters, the resin ought to be entirely omitted, unless where a continuance of the pain and irritation, excited by the vesicatory, is required. Indeed plasters of any kind are not very proper for this purpose: their consistence makes them sit uneasy, and their adhesiveness renders the taking them off painful. Cerates, which are softer and less adhesive, appear much more eligible: the cerate of spermaceti will serve for general use; and for some particular purposes, the cerate of yellow resin may be applied.

Cummin-plaster. L.

- 617 Take of the seeds of cummin, seeds of caraway, bay-berries, each three ounces; Burgundy-pitch, three pounds; yellow wax, three ounces. Mix, with the melted pitch and wax, the rest of the ingredients, powdered, and make a plaster.

This plaster stands recommended as a moderately warm discutient; and is directed by some to be applied to the hypogastric region, for strengthening the viscera, and expelling flatulencies: but it is a matter of great doubt, whether it derives any virtue either from the article from which it is named, or from the caraway or bay-berries which enter its composition.

Fetid, commonly called antihysterie, plaster. E.

- 618 Take of common plaster, asafœtida, strained, each two parts; yellow wax, strained galbanum, each one part. Mix, and make them into a plaster.

This plaster is applied to the umbilical region, or over the whole abdomen, in hysterical cases; and sometimes with good effect; but probably more from its giving an additional degree of heat to the part, than from any influence derived from the fetid

gums. It has indeed been alleged, that from the application of this plaster to the abdomen, the taste of asafœtida can be distinctly perceived in the mouth; and it is not improbable, that some absorption of its active parts may take place by the lymphatic vessels of the surface; while, at the same time, the asafœtida thus applied must constantly, in some degree, act on the nerves of the nose. But, in both these ways, its influence can be inconsiderable only; and much more effect may be obtained from a very small quantity taken internally. And we are on the whole inclined to think, that the addition of the fetid gums to the common plaster is here more disagreeable than useful.

Ladanum plaster. L.

Take of ladanum, three ounces; frankincense, one ounce; cinnamon powdered, expressed oil, called oil of mace, of each half an ounce; essential oil of spearmint, one dram. To the melted frankincense add first the ladanum, softened by heat; then the oil of mace. Mix these afterwards with the cinnamon and oil of mint, and beat them together in a warm mortar into a plaster. Let it be kept in a close vessel.

This has been considered as a very elegant stomach plaster. It is contrived so as to be easily made occasionally (for these kinds of compositions, on account of their volatile ingredients, are not fit for keeping), and to be but moderately adhesive, so as not to offend the skin, and that it may without difficulty be frequently taken off and renewed; which these sorts of applications, in order to their producing any considerable effect, require to be. But after all, it probably acts more from the mere covering which it gives to the stomach, than from any of the articles abounding with essential oil which it contains.

Litharge-plaster. L.

Take of litharge, in very fine powder, five pounds; olive-oil, a gallon. Boil them with a slow fire, in about two pints of water, constantly stirring until the oil and litharge unite, and have the consistence of a plaster. But it will be proper to add more boiling water, if the water that was first added be nearly consumed before the end of the process.

Common plaster. E.

Take of litharge, one part; olive-oil, two parts; boil them, adding water, and constantly stirring the mixture till the oil and litharge be formed into a plaster.

The heat in these processes should be gentle, and the matter kept constantly stirring, otherwise it swells up, and is apt to run over the vessel. If the composition proves discoloured, the addition of a little white lead and oil will improve the colour.

These plasters, which have long been known under the name of *Diachylon*, are the common application in excoriations of the skin, slight flesh wounds, and the like. They keep the part soft, and somewhat warm, and defend it from the air, which is all that can be expected in these cases from any plaster. Some

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of our industrious medicine-makers have thought these purposes might be answered by a cheaper composition, and accordingly have added a large quantity of common whitening and hogs lard: this, however, is by no means allowable, not only as it does not stick so well, but likewise as the lard is apt to grow rancid and acrimonious. The counterfeit is distinguishable by the eye.

Litharge plaster with gum. L.

- 621 Take of litharge-plaster, three pounds; strained galbanum, eight ounces; turpentine, ten drams; frankincense, three ounces. The galbanum and turpentine being melted with a slow fire, mix with them the powdered frankincense, and afterwards, the litharge-plaster melted with a very slow fire, and make a plaster.

Gum-plaster. E.

Take of common plaster, eight parts; gum-ammoniacum strained, strained galbanum, yellow wax, each one part. Make them into a plaster according to art.

Both these plasters are used as digestives and suppuratives; particularly in abscesses, after a part of the matter has been matured and discharged, for suppurating or discussing the remaining hard part; but it is very doubtful whether they derive any advantage from the gums entering their composition.

Litharge-plaster with quicksilver. L.

- 622 Take of litharge-plaster, one pound; purified quicksilver, three ounces; sulphurated oil, one dram, or what is sufficient. Make the plaster in the same manner as the ammoniacum-plaster with quicksilver.

Mercurial or blue plaster. E.

Take of olive-oil, white resin, each one part; quicksilver, three parts; common plaster, six parts. Melt the oil and resin together, and when this mixture is cold, let the quicksilver be rubbed with it till the globules disappear; then add by degrees the common plaster, melted, and let the whole be accurately mixed.

These mercurial plasters are looked on as powerful resolvents and discutients, acting with much greater certainty for these intentions than any composition of vegetable substances alone; the mercury exerting itself in a considerable degree, and being sometimes introduced into the habit in such quantity as to affect the mouth. Pains in the joints and limbs from a venereal cause, nodes, tophi, and beginning indurations of the glands, are said sometimes to yield to them.

Litharge plaster with resin. L.

- 623 Take of litharge-plaster, three pounds; yellow resin, half a pound. Mix the powdered resin with litharge plaster, melted with a very slow fire, and make a plaster.

Sticking-plaster. E.

Take of common plaster, five parts; white resin, one

part. Melt them together, so as to make a plaster.

These plasters are used chiefly as adhesives for keeping on other dressings, &c.

Plaster of Burgundy pitch. L.

Take of Burgundy pitch, two pounds; ladanum, one pound; yellow resin, yellow wax, of each four ounces; the expressed oil, commonly called the oil of mace, one ounce. To the pitch, resin, and wax, melted together, add first the ladanum, and then the oil of mace.

This plaster was at one time much celebrated under the title of *cephalic plaster*, the name which it formerly held in our pharmacopœias. It was applied in weakness or pains of the head, to the temples, forehead, &c. and sometimes likewise to the feet. Schulze relates, that an inveterate rheumatism in the temples, which at times extended to the teeth, and occasioned intolerable pain, was completely cured in two days by a plaster of this kind (with the addition of a little opium) applied to the part, after many other remedies had been tried in vain. He adds, that a large quantity of liquid matter exuded under the plaster in drops, which were so acrid as to corrode the cuticle: but it is probable, that this was much more the effect of the Burgundy pitch than of any other part of the composition; for when applied to very tender skin, it often produces even vesication, and in most instances operates as a rubefacient or hot plaster: and as far as it has any good effect in headach, it is probable that its influence is to be explained on this ground.

Soap-plaster. L.

Take of soap, half a pound; litharge-plaster, three pounds; mix the soap with the melted litharge-plaster, and boil them to the thickness of a plaster.

Saponaceous plaster. E.

Take of common plaster, four parts; gum-plaster, two parts; Castile soap, scraped, one part. To the plasters, melted together, add the soap; then boil for a little, so as to form a plaster.

These plasters have been supposed to derive a resolvent power from the soap; and in the last, the addition of the gums is supposed to promote the resolvent virtue of the soap: but it is a matter of great doubt, whether they derive any material advantage from either addition.

Frankincense plaster. L.

Take of frankincense, half a pound; dragon's blood, three ounces; litharge plaster, two pounds. To the melted litharge-plaster add the rest, powdered.

This plaster had formerly in the London pharmacopœia the title of *strengthening plaster*, and is a reformation of the complicated and injudicious composition described in the former pharmacopœias, under the title of *Emplastrum ad herniam*. Though far the most elegant and simple, it is as effectual for that purpose as any of the medicines of this kind. If constantly worn with a proper bandage, it will, in children, frequently do service; though, perhaps, not so much

from any strengthening quality of the ingredients, as from its being a soft, close, and adhesive covering. It has been supposed that plasters composed of styptic medicines constrict and strengthen the part to which they are applied, but on no very just foundation; for plasters in general relax rather than astringe, the unctuous ingredients necessary in their composition counteracting and destroying the effect of the others.

Defensive or strengthening plaster. E.

- 627 Take of common plaster, twenty-four parts; white resin, six parts; yellow-wax, oil olive, each three parts; colcothar of vitriol, eight parts. Grind the colcothar with the oil, and then add it to the other ingredients previously melted.

This plaster is laid round the lips of wounds and ulcers over the other dressings, for defending them from inflammation and a fluxion of humours; which, however, as Mr Sharp very justly observes, plasters, on account of their consistence, tend rather to bring on than to prevent. It is also used in weaknesses of the large muscles, as of the loins; and its effects seem to proceed from the artificial mechanical support given to the part, which may also be done by any other plaster that adheres with equal firmness.

Deadly night-shade plaster. Brun.

- 628 Take of the juice of the recent herb of belladonna, linseed oil, each nine ounces; yellow-wax, six ounces; Venice turpentine, six drams; powder of the herb of belladonna, two ounces. Let them be formed into a plaster according to art.

There can be no doubt that the belladonna, externally applied, has a very powerful influence, both on the nerves and blood vessels of the part; and thus it has very considerable effect both on the circulation and state of sensibility of the part; and when applied under the form of this plaster, especially in affections of the mammæ and scrotum, it has been said to have very powerful influence in alleviating pain, in dissolving tumors, and in promoting a favourable suppuration. It has however been but little employed in this country; and we can say nothing of it from our own experience.

Corn-plaster. Dan.

- 629 Take of galbanum, dissolved in vinegar, and again inspissated, one ounce; pitch, half an ounce; diachylon, or common plaster, two drams. Let them be melted together; and then mix with them verdigris powdered, sal ammoniac, each one scruple; and make them into a plaster.

Of this plaster, as well as the former, we can say nothing from our own experience. It has been celebrated for the removal of corns, and for alleviating the pain which they occasion; and it is not improbable that it may sometimes have a good effect from the corrosive articles which it contains: but in other cases, from this very circumstance, it may tend to aggravate the pain, particularly in the first instance.

Hemlock plaster. Suec.

- 630 Take of yellow wax, half a pound; oil olive, four ounces; gum-ammoniacum, half an ounce: after

they are melted together, mix with them powdered herb of hemlock, half a pound.

This corresponds very nearly with the Emplastrum de cicuta cum ammoniaco, which had formerly a place in our pharmacopœias, and was supposed to be a powerful cooler and discutient, and to be particularly serviceable against swellings of the spleen and distensions of the hypochondres. For some time past, it has been among us entirely neglected; but the high resolvent power which Dr Stoerk has discovered in hemlock, and which he found it to exert in this as well as in other forms, intitle it to further trials. The plaster appears very well contrived, and the additional ingredients well chosen for assisting the efficacy of the hemlock.

Corrosive plaster. Gen.

- Take of corrosive sublimate mercury, half a dram; hogs lard, half an ounce; yellow wax, two drams. Mix them according to art. 631

There can be no doubt that the muriated mercury here employed is a very powerful corrosive; and there may be some cases in which it is preferable to other articles of the tribe of caustics: but this would seem to be a very uneconomical mode of applying it, as but a very small portion of what enters the plaster can act; and even that portion must have its action much restrained by the unctuous matters with which it is combined.

Plaster of fenugreek, or of mucilages. Gen.

- Take of fenugreek-seed, two ounces; linseed-oil, warm, half a pound. Infuse them according to art, and strain; then take of yellow wax, two pounds and an half; gum-ammoniac, strained, six ounces; turpentine, two ounces. Melt the gum-ammoniac with the turpentine, and by degrees add the oil and wax, melted in another vessel, so as to form a plaster. 632

This plaster had formerly a place in our pharmacopœias, but was rejected; and although still held in esteem by some, it is probably of no great value; at least it would seem to derive but little either from the fenugreek seed, with which it is now made, or from the oil and mucilages which formerly entered its composition.

Hembane-plaster. Suec.

- This is directed to be prepared in the same manner as the emplastrum e conio, or hemlock-plaster. 633

From the well-known sedative power of this plant, as affecting the nervous energy of the part to which it is applied, we might reasonably conclude that good effects may be obtained from it when used under the form of plaster; and accordingly it has been with advantage employed in this manner, for allaying pain, and resolving swelling, in cases of scirrhus and cancer.

Pitch-plaster. Ross.

- Take of white resin, six ounces; ship-pitch, seven ounces; yellow wax, five ounces. Melt them, and form them into a plaster. 634

Pitch, applied externally, has been supposed to act on two principles, by its warmth and by its adhesive quality.

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quality. In the former way it may have some effect; but it has much more influence in the latter; and particularly it has thus been found to produce a cure in cases of tinea capitis. When a pitch-plaster is applied to the affected part of the hairy scalp, and allowed to remain there for a few days, it becomes so attached to the parts, that it cannot be removed without bringing with it the bulbs of the hair in which the disease is seated: and by this means a radical cure is not unfrequently obtained, after every other remedy has been tried in vain. But the cure is a painful one, and not without danger: for in some instances, inflammations, even of an alarming nature, have been excited by the injury thus done to the parts. Hence this mode of cure is rarely had recourse to till others have been tried without effect: and when it is employed, if the disease be extensive, prudent practitioners direct its application only to a small portion at a time, the size of a crown-piece or so: and after one part is fully cured, by application to another in succession, the affection may be soon completely overcome. With this intention it is most common to employ the pitch in its pure state: but the plaster here directed, while it is no less adhesive, is more manageable and flexible.

CHAP. XXXII. *Ointments and Liniments.*

635 OINTMENTS and liniments differ from plasters little otherwise than in consistence. Any of the officinal plasters, diluted with so much oil as will reduce it to the thickness of stiff honey, forms an ointment: by farther increasing the oil, it becomes a liniment.

In making these preparations, the Edinburgh college direct, that fat and resinous substances are to be melted with a gentle heat; then to be constantly stirred, sprinkling in at the same time the dry ingredients, if any such are ordered, in the form of a very fine powder, till the mixture on diminishing the heat becomes stiff.

It is to be understood that the above general directions are meant to apply to each particular composition contained in the present edition of the Edinburgh pharmacopœia. It is also to be observed, that where any compositions are ordered, as bases or ingredients of others, the college always refer to those made according to their own formula.

Ointment of hog's lard. L.

636 Take of prepared hog's lard, two pounds; rose-water, three ounces. Beat the lard with the rose-water until they be mixed; then melt the mixture with a slow fire, and set it apart that the water may subside; after which, pour off the lard from the water, constantly stirring until it be cold.

In the last edition of the London pharmacopœia, this was styled *Unguentum simplex*, the name given by the Edinburgh college to the following.

Simple ointment. E.

Take of olive oil, five parts; white wax, two parts.

Both these ointments may be used for softening the skin and healing chaps. The last is, however, preferable, on account of its being of one uniform con-

sistence. For the same reason it is also to be preferred as the basis of other more compounded ointments.

Ointment of verdegris. E.

Take of basilicon ointment, fifteen parts; verdegris, one part. 637

This ointment is used for cleansing sores, and keeping down fungous flesh. Where ulcers continue to run from a weakness in the vessels of the part, the tonic powers of copper promise considerable advantage.

It is also frequently used with advantage in cases of ophthalmia, depending on scrofula, where the palpebræ are principally affected; but when it is to be thus applied, it is in general requisite that it should be somewhat weakened by the addition of a proportion of simple ointment or hog's lard. An ointment similar to the above, and celebrated for the cure of such instances of ophthalmia, has long been sold under the name of *Smellon's eye-salve*.

Ointment of the white calx of quicksilver. L.

Take of the white calx of quicksilver, one dram; ointment of hog's lard, one ounce and a half. Mix, and make an ointment. 638

This is a very elegant mercurial ointment, and frequently used in the cure of obstinate and cutaneous affections. It is an improvement of the ointment of precipitated mercury of the last London pharmacopœia; the precipitated sulphur being thrown out of the composition, and the quantity of mercury increased.

Ointment of calx of zinc. E.

Take of simple liniment, six parts; calx of zinc, one part. 639

This ointment is chiefly used in affections of the eye, particularly in those cases where redness arises rather from relaxation than from active inflammation.

Ointment of Spanish flies. L.

Take of Spanish flies, powdered, two ounces; distilled water, eight ounces; ointment of yellow resin, eight ounces. Boil the water with the Spanish flies to one half, and strain. To the strained liquor add the ointment of yellow resin. Evaporate this mixture in a water-bath, saturated with sea-salt, to the thickness of an ointment. 640

Epispastic ointment from infusion of cantharides. E.

Take of cantharides, white resin, yellow wax, each one ounce; hog's lard, Venice turpentine, each two ounces; boiling water, four ounces. Infuse the cantharides in the water, in a close vessel, for a night; then strongly press out and strain the liquor, and boil it with the lard till the water be consumed; then add the resin, wax, and turpentine, and make the whole into an ointment.

These ointments, containing the soluble parts of the cantharides, uniformly blended with the other ingredients, are more commodious, in general occasion less pain, and are no less effectual in some cases, than the compositions with the fly in substance. This, however,

does not uniformly hold; and accordingly the Edinburgh college, with propriety, still retain an ointment containing the flies in substance.

Epispastic ointment, from powder of cantharides. E.

641 Take of basilicon ointment, seven parts; powdered cantharides, one part.

This ointment is employed in the dressings for blisters, intended to be made *perpetual*, as they are called, or to be kept running for a considerable time, which in many chronic, and some acute cases, is of great service. Particular care should be taken, that the cantharides employed in these compositions be reduced to a very fine powder, and that the mixture be made as equal and uniform as possible. But with these precautions, there are some particular habits in which this ointment operates with even less pain than the former, while at the same time it is generally more effectual.

Wax ointment. L.

642 Take of white wax, four ounces; spermaceti, three ounces; olive-oil, one pint. Stir them, after being melted with a slow fire, constantly and briskly, until cold.

This ointment had formerly the title of *unguentum album* in the London pharmacopœia. It differs very little from the simple ointment of the Edinburgh pharmacopœia, and in nothing from the ointment of spermaceti of the London pharmacopœia, excepting that in this ointment the proportion of spermaceti is somewhat less. It is an useful cooling ointment for excoriations and other frettings of the skin.

Ointment of acetated ceruse. L.

643 Take of acetated ceruse, two drams; white wax, two ounces; olive-oil, half a pint. Rub the acetated ceruse, previously powdered, with some part of the olive-oil; then add it to the wax, melted with the remaining oil. Stir the mixture until it be cold.

Saturnine ointment. E.

Take of simple ointment, twenty parts; sugar of lead, one part.

Both these ointments are useful coolers and defecatives; much superior both in elegance and efficacy to the *nutritum* or *triphar-macum*, at one time very much celebrated.

Ointment of ceruse, commonly called white ointment. E.

644 Take of simple ointment, five parts; ceruse, one part.

This is an useful, cooling, emollient ointment, of great service in excoriations and other similar frettings of the skin. The ceruse has been objected to by some, on a suspicion that it might produce some ill effects, when applied, as these unguents frequently are, to the tender bodies of children. Though there does not seem to be much danger in this external use of ceruse, the addition of it is the less necessary here, as we have another ointment containing a more active preparation of the same metal, the saturnine ointment just mentioned; which may be occasionally mixed with this, or employed by itself, in cases where saturnine applications are wanted.

Ointment of elemi. L.

Take of elemi, one pound; turpentine, ten ounces; mutton-suet, prepared, two pounds; olive-oil, two ounces. Melt the elemi with the suet; and having removed it from the fire, mix it immediately with the turpentine and oil, after which strain the mixture.

This ointment, perhaps best known by the name of *linimentum arcei*, has long been in use for digesting, cleansing, and incarnating; and for these purposes is preferred by some to all the other compositions of this kind.

These, however, are much more processes of nature than of art; and it is much to be doubted whether it has in reality any influence.

Ointment of white hellebore. L.

Take of the root of white hellebore, powdered, one ounce; ointment of hog's lard, four ounces; essence of lemons, half a scruple. Mix them, and make an ointment.

White hellebore externally applied has long been celebrated in the cure of cutaneous affections; and this is perhaps one of the best formulæ under which it can be applied, the hog's-lard ointment serving as an excellent basis for it, while the essence of lemons communicates to it a very agreeable smell.

Stronger ointment of quicksilver. L.

Take of purified quicksilver, two pounds; hog's lard, prepared, twenty-three ounces; mutton-suet, prepared, one ounce. First rub the quicksilver with the suet and a little of the hog's lard, until the globules disappear; then add what remains of the lard, and make an ointment.

Weaker ointment of quicksilver. L.

Take of the stronger ointment of quicksilver, one part; hog's lard, prepared, two parts. Mix them.

Quicksilver, or blue ointment. E.

Take of quicksilver, mutton-suet, each one part; hog's lard, three parts. Rub them carefully in a mortar till the globules entirely disappear.

This ointment may also be made with double or triple the quantity of quicksilver.

These ointments are principally employed, not with a view to their topical action, but with the intention of introducing mercury in an active state into the circulating system. And this may be effected by gentle friction on the sound skin of any part, particularly on the inside of the thighs or legs. For this purpose, these simple ointments are much better suited than the more compounded ones with turpentine and the like, formerly employed. For by any acrid substance topical inflammation is apt to be excited, preventing farther friction, and giving much uneasiness. To avoid this, it is necessary, even with the mildest and weakest ointment, somewhat to change the place at which the friction is performed. But by these ointments properly managed, mercury may in most instances be as advantageously introduced, either for eradicating syphilis,

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lis, or combating other obstinate diseases, as under any form whatever. But to obtain these effects, it is requisite that the ointment should be prepared with very great care: for upon the degree of triture which has been employed, the activity of the mercury must entirely depend. The addition of the mutton-suet, now adopted by both colleges, is an advantage to the ointment, as it prevents it from running into the state of oil, which the hog's lard alone in warm weather, or in a warm chamber, is sometimes apt to do, and which is followed by a separation of parts. We are even inclined to think, that the proportion of suet directed by the London college is too small for this purpose, and indeed seems to be principally intended for the more effectual triture of the mercury: But it is much more to be regretted, that, in a medicine of such activity, the two colleges should not have directed the same proportion of mercury to the fatty matter. For although both have directed ointments of different strength, neither the weakest nor the strongest agree in the proportion of mercury which they contain.

Ointment of nitrated quicksilver. L.

- 648 Take of purified quicksilver, one ounce; nitrous acid, two ounces; hog's lard, prepared, one pound. Dissolve the quicksilver in the nitrous acid; and, while it is yet hot, mix it with the hog's lard, previously melted, and just growing cold.

Yellow ointment. E.

Take of quicksilver, one ounce; spirit of nitre, two ounces; hog's lard, one pound. Dissolve the quicksilver in the spirit of nitre, by digestion in a sand-heat; and, while the solution is very hot, mix with it the lard, previously melted by itself, and just beginning to grow stiff. Stir them briskly together, in a marble mortar, so as to form the whole into an ointment.

These ointments differ only in name; and that employed by the London college is certainly the preferable appellation: For here the quicksilver, previous to its union with the lard, is brought to a saline state by means of the nitrous acid. And although its activity be very considerably moderated by the animal fat with which it is afterwards united, yet it still affords us a very active ointment; and as such it is frequently employed with success in cutaneous and other topical affections. In this condition, however, the mercury does not so readily enter the system as in the preceding form. Hence it may even be employed in some cases with more freedom; but in other instances it is apt to excoriate and inflame the parts. On this account a reduction of its strength is sometimes requisite; and it is often also necessary, from the hard consistence which it acquires, in consequence of the action of acid on the lard.

Tar ointment.

- 649 Take of tar, mutton suet prepared, each half a pound. Melt them together, and strain. L.
Take of tar, five parts; yellow wax, two parts. E.
These compositions, though the one be formed into an ointment by means of suet, the other by wax, can-

not be considered as differing essentially from each other. As far as they have any peculiar activity, this entirely depends on the tar. And this article, from the empyreumatic oil and saline matters which it contains, is undoubtedly, as well as turpentine, of some activity. Accordingly, it has been successfully employed against some cutaneous affections, particularly those of domestic animals. At one time, as well as the black basilicon, it was a good deal employed as a dressing even for recent wounds. But although it still retains a place in our pharmacopœias, it is at present little used with any intention.

Ointment of yellow resin. L.

- Take of yellow resin, yellow wax, each one pound; olive oil, one pint. Melt the resin and wax with a slow fire; then add the oil, and strain the mixture while hot.

Basilicon ointment. E.

- Take of hog's lard, eight parts; white resin, five parts; yellow wax, two parts.

These are commonly employed in dressings, for digesting, cleansing, and incarnating wounds and ulcers. They differ very little, if at all, in their effects, from the *linimentum arcae*, or ointment of elemi, as it is now more properly styled. But it is probable that no great effect is to be attributed to either: For there can be no doubt that the suppurative and adhesive inflammation are processes of nature, which will occur without the aid of any ointment.

Elder ointment. L.

- Take of elder flowers, four pounds; mutton-suet, prepared, three pounds; olive-oil, one pint. Boil the flowers in the suet and oil, first melted together, till they be almost crisp; then strain with expression.

This ointment does not seem superior to some others, which are much neater, and less expensive. It can scarcely be supposed to receive any considerable virtue from the ingredient from which it takes its name. And accordingly it is not without propriety that it is rejected from the pharmacopœia of the Edinburgh college.

Ointment of spermaceti. L.

- Take of spermaceti, six drams; white wax, two drams; olive-oil, three ounces. Melt them together over a slow fire, stirring them constantly and briskly until they be cold.

This had formerly the name of *white liniment*, and it is perhaps only in consistence that it can be considered as differing from the simple ointment already mentioned, or the simple cerate afterwards to be noticed.

Sulphur ointment. L.

- Take of ointment of hog's lard, half a pound; flowers of sulphur, four ounces. Mix them, and make an ointment.

Ointment of sulphur, or antipsoric ointment. E.

- Take of hog's lard, four parts; sulphur, beat into a very

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very fine powder, one part. To each pound of this ointment add essence of lemons, or oil of lavender, half a dram.

Sulphur is a certain remedy for the itch, and safer than mercury. Sir John Pringle observes, that unless a mercurial unction was to touch every part of the skin, there can be no certainty of success: whereas, from a sulphureous one, a cure may be obtained by only partial unction; the animalcula, which are supposed to occasion this disorder, being, like other insects, killed by the sulphureous steams which exhale by the heat of the body. As to the internal use of mercury, which some have accounted a specific, there are several instances of men undergoing a complete salivation for the cure of the lues venerea, without being freed from the itch: but there are also a multitude of instances of men undergoing a long course of sulphur without effect, and who were afterwards readily cured by mercury.

The quantity of ointment, above directed, serves for four unctions: the patient is to be rubbed every night; but to prevent any disorder that might arise from stopping too many pores at once, a fourth part of the body is to be rubbed at one time. Though the itch may thus be cured by one pot of ointment, it will be proper to renew the application, and to touch the parts most affected for a few nights longer, till a second quantity also be exhausted; and in the worst cases, to subjoin the internal use of sulphur, not with a view to purify the blood, but to diffuse the steams more certainly through the skin; there being reason to believe, that the animalcula may sometimes lie too deep to be thoroughly destroyed by external applications.

Tutty ointment.

654 Take of prepared tutty, one dram; ointment of spermaceti, what is sufficient. Mix them so as to make a soft ointment. L.

Take of simple liniment, five parts; prepared tutty, one part. E.

These ointments have long been celebrated, and are still much employed against affections of the eyes. But they cannot, we imagine, be esteemed elegant.

Both calamine and tutty act only by means of the zinc they contain, and calamine appears to contain the most of the two, and likewise to be the least variable in its contents. But the pure flowers prepared from zinc itself are doubtless preferable to either. Hence the ointment of tutty may be considered as inferior to both the ointment of calamine and to the ointment of the calx of zinc, which have also a place in our pharmacopœia.

Simple liniment. E.

655 Take of olive oil, four parts; white wax, one part.

This consists of the same articles which form the simple ointment of the Edinburgh pharmacopœia, but merely in a different proportion, so as to give a thinner consistence; and where a thin consistence is requisite, this may be considered as a very elegant and useful application.

Liniment of ammonia. L.

656 Take of water of ammonia, half an ounce; olive-oil,

one ounce and an half. Shake them together in a phial till they are mixed.

This has long been known in the shops under the title of *volatile liniment*, but is now more properly denominated from the principal active article, which enters its composition. It has been much employed in practice, particularly on the recommendation of Sir John Pringle in his *Observations on the Diseases of the Army*. He observes, that, in the inflammatory quinsey, or strangulation of the fauces, a piece of flannel, moistened with this mixture, applied to the throat, and renewed every four or five hours, is one of the most efficacious remedies. By means of this warm stimulating application, the neck, and sometimes the whole body, is put into a sweat, which after bleeding either carries off or lessens the inflammation. Where the skin cannot bear the acrimony of this mixture, a larger proportion of oil may be used.

Stronger liniment of ammonia. L.

Take of water of pure ammonia, one ounce; olive-oil, two ounces. Shake them together in a phial. 657

This article differs from the foregoing in strength only. This arises both from its being formed of a more acrid spirit, and from its containing that spirit in a larger proportion to the oil. It is used to supply the place of the *epithema et emplastrum volatile* of our former pharmacopœias, and is a very acrid stimulating composition. When largely applied, it often excites inflammation, and even vesication, on tender skin. It is often, however, successfully employed against obstinate rheumatic and ischiadic pains.

Camphor liniment. L.

Take of camphor, two ounces; water of ammonia, six ounces; simple spirit of lavender, sixteen ounces. Mix the water of ammonia with the spirit, and distil from a glass retort, with a slow fire, sixteen ounces. Then dissolve the camphor in the distilled liquor. 658

This formula, which has now for the first time a place in the London pharmacopœia, approaches to the volatile essence of that celebrated empiric the late Dr Ward: But the above is a more elegant and active formula than either of the receipts published by Mr Page, from Dr Ward's book of receipts; and there is no reason to doubt that it will be equally effectual in removing some local pains, such as particular kinds of headach, in consequence of external application.

Soap-liniment. L.

Take of soap, three ounces; camphor, one ounce; spirit of rosemary, one pint. Digest the soap in the spirit of rosemary until it be dissolved, and add to it the camphor. 659

This is the soap liniment of the former edition of the London pharmacopœia, without any alteration; and it differs very little from the soap-balsam of the Edinburgh college already mentioned. Though a less active and penetrating application than the preceding, it is perhaps no less useful: and it is often successfully employed for external purposes against rheumatic pains, sprains, bruises, and similar complaints.

Egypt.

Egyptian ointment. Gen.

Take of honey, one pound; strong vinegar, half a pound; verdegris, powdered, five ounces. Let the ingredients be boiled together till the verdegris be dissolved, so that the ointment may have a due degree of thickness and a purple colour.

This preparation had formerly a place in our pharmacopœias under the title of *Egyptian honey*: and a similar preparation has now a place under the title of *oxymel of verdegris*. But in that formula the proportion is much less than in the above. It may justly be considered as a very powerful application for cleansing and detaching foul ulcers, as well as for keeping down fungous flesh. But these purposes may in general be answered by articles less acrid, and exciting less pain. Besides this, the above preparation is also liable to considerable uncertainty with respect to strength; for a large proportion of the verdegris will in a short time subside to the bottom; thus, what is in the top of the pot is much less active than that in the bottom.

Anodyne ointment. Gen.

Take of olive-oil, ten drams; yellow wax, half an ounce; crude opium, one dram. Mix them according to art, so as to form an ointment.

Opium thus externally applied, will in some degree be productive of the same effect as when used under the form of the anodyne balsam. In that state it produces its effects more immediately; but under the present form its effects are more permanent. Besides this, the present ointment furnishes us with an useful dressing for sores attended with severe pain; to which opium when dissolved in spirit cannot be applied. Hence the present, or some analogous formula, is well intitled to a place in our pharmacopœias.

Ointment for an ulcerated cancer. Brun.

Take of the recently expressed juice of the ricinus, one pound: let it be exposed to the rays of the sun in a leaden vessel till it acquire the consistence of an oil; then to one pound of this inspissated juice add calcined lead, white precipitate mercury, each one pound. Let them be properly mixed.

This acrid application must possess a considerable degree of corrosive power. And in some cases of cancer, by the proper application of corrosives, much benefit may be done: But where the disease has made any considerable progress, these will in general have the effect rather of hastening its progress than of removing it; particularly if there be a large indolent tumor below the ulcer.

Digestive ointment. Ross.

Take of Venice turpentine, one pound; the yolks of eight eggs. Mix them together according to art.

This warm stimulating application is well suited to promote the suppurative inflammation, and may be advantageously had recourse to, where it is necessary to encourage a large discharge of pus.

Hæmorrhoidal ointment.

Take saturnine ointment, six drams; oil of hyoscya-

mus, obtained by boiling, two drams; camphor, powdered, two scruples; saffron, one scruple. Mix them into an ointment.

The name affixed to this ointment expresses the purpose for which it is applied. From the articles of which it consists, it may be concluded, that it possesses a gently emollient and anodyne power; and may therefore afford considerable relief, where much pain arises from external hæmorrhoidal tumors.

Laurel ointment. Suec.

Take of prepared mutton-suet, eight ounces. After it is melted and removed from the fire, add to it oil of bays, one pound; ethereal oil of turpentine, one ounce; rectified oil of amber, half an ounce. Let them be mixed and rubbed together till they form an ointment.

This is an improved mode of forming an ointment which had formerly a place in our pharmacopœias under the title of *nervine ointment*. And it furnishes a warm stimulating nervine application, which may in some degree restore sense and motion to paralytic limbs. And while it at least serves to lead to the careful use of friction, it may somewhat increase the benefit which would result from it.

Ointment of tobacco. Dan.

Take of the leaves of tobacco, three pounds; juice of tobacco, nine ounces; hog's lard, a pound and a half; resin, three ounces. Let the cut leaves be macerated for the space of a night, and then boiled over a gentle fire. Having strained the fluid obtained by expression, add to it yellow wax, half an ounce; powder of the root of birthwort, three ounces. Mix them into an ointment.

There can be no doubt that tobacco externally applied has very powerful effects on the human body; and that not merely from its topical action, but sometimes even as affecting the system in general. From this last circumstance it requires to be used with great caution. It has, however, been found, under proper management, to afford an effectual cure in obstinate cutaneous affections. But were it to be used with this intention, we would have a more elegant formula, by merely impregnating either hog's lard, or the simple ointment, with the active qualities extracted by the aid of heat from the leaves of the prepared tobacco in the state in which it is usually brought to us from America, than by having recourse to the recent juice, and to the aristolochia and other additions here directed.

Ointment of storax. Suec.

Take of olive oil, a pound and a half; white resin, gum elemi, yellow wax, each seven ounces. After they are melted together and strained, add liquid storax, seven ounces. Mix them together, and agitate the mixture till it concretes into an uniform ointment.

An ointment supposed to derive its activity from the storax, although it have no place in our pharmacopœias, is received into most of the foreign ones. And it has been much celebrated not only as a strengthening application to weakly children, but even for the removal of affections of the bones, as in cases of rachi-

tis and the like. It is, however, very doubtful how far these properties depend on the storax. If it have really any good effect, it is probable that this is more the consequence of the friction merely, than of any of the articles which enter the composition of the ointment. But there is reason to believe that the virtues attributed to this ointment are more imaginary than real.

Onion ointment. Suec.

- 668 Take of yellow wax, resin, each half a pound. To these melted, add onions roasted under the ashes, honey, each two pounds and a half; black soap, half a pound. Let them be gently boiled together till all the moisture be consumed, then strain the liquor, expressing it from the materials, and afterwards agitate it with a wooden pestle that it may unite into one uniform mass.

This ointment is applied with the intention of promoting suppuration. And it has long been supposed, that the onion, especially in its roasted state, has a remarkable influence in this way: but there is reason to think, that the powers attributed to it have been greatly over-rated. And there is even ground to presume that these effects totally depend entirely on heat and moisture. Hence no application is perhaps better suited for promoting suppuration than a poultice of bread and milk, applied as hot as can be borne with and frequently repeated.

CHAP. XXXIII. *Cerates.*

- 699 CERATES are substances intended for external application, formed of nearly the same materials which constitute ointments and plasters. And they differ principally from these in being merely of an intermediate consistence between the two. Accordingly, they are seldom the subject of a separate chapter by themselves, but are classed either with the one or the other. In the Edinburgh pharmacopœia they are classed among the ointments: but as the London college have referred them to a separate head, we shall here also consider them by themselves.

Simple cerate. E.

- 670 Take of olive oil, six parts; white wax, three parts; spermaceti, one part. Unite them according to art.

This differs from the simple ointment in containing a greater proportion of wax to the oil, and in the addition of the spermaceti. But by these means it obtains only a more firm consistence, without any essential change of properties.

Cerate of cantharides, or Spanish flies. L.

- 671 Take of cerate of spermaceti, softened with heat, six drams; Spanish flies, finely powdered, one dram. Mix them.

Under this form cantharides may be made to act to any extent that is requisite. It may supply the place either of the blistering plaster or ointment; and there are cases in which it is preferable to either. It is particularly more convenient than the plaster of cantharides, where the skin to which the blister is to be applied is previously much affected, as in cases of small-

pox; and in supporting a drain under the form of issue, it is less apt to spread than the softer ointment.

Calamine-cerate. L.

- Take of calamine prepared, yellow wax, each half a pound; olive oil, one pint. Melt the wax with the oil; and, as soon as the mixture begins to thicken, mix with it the calamine, and stir the cerate until it be cold.

Cerate of calamine. E.

- Take of simple cerate, five parts; calamine prepared, one part.

These compositions are formed on the cerate which Turner strongly recommends in cutaneous ulcerations and excoriations, and which has been usually distinguished by his name. They appear from experience to be excellent epulotics, and as such are frequently used in practice.

Cerate of acetated litharge. L.

- Take of water of acetated litharge, two ounces and a half; yellow wax, four ounces; olive oil, nine ounces; camphor, half a dram. Rub the camphor with a little of the oil. Melt the wax with the remaining oil; and as soon as the mixture begins to thicken, pour in by degrees the water of acetated litharge, and stir constantly until it be cold; then mix in the camphor before rubbed with oil.

This application has been rendered famous by the recommendations of Mr Goulard. It is unquestionably in many cases very useful. It cannot, however, be considered as varying essentially from the saturnine ointment, or ointment of acetated ceruse, formerly mentioned. It is employed with nearly the same intentions, and differs from it chiefly in consistence.

Cerate of yellow resin. L.

- Take of ointment of yellow resin, half a pound; yellow wax, one ounce. Melt them together, and make a cerate.

This had formerly the name of *lemon ointment*. It is no otherwise different from the yellow basilicum, or ointment of yellow resin, than being of a stiffer consistence, which renders it for some purposes more commodious.

Soap cerate. L.

- Take of soap, eight ounces; yellow wax, ten ounces; litharge, powdered, one pound; olive oil, one pint; vinegar, one gallon; boil the vinegar with the litharge over a slow fire, constantly stirring until the mixture unites and thickens; then mix in the other articles, and make a cerate.

This, notwithstanding the name, may rather be considered as another saturnine application; its activity depending very little on the soap; and it may be held as varying in little else but consistence from the plaster of litharge. It can hardly be thought to differ in its properties from the cerate of acetated litharge just mentioned; for neither the small proportion of camphor which enters the composition of the one, nor the soap which gives name to the other, can be considered as having much influence.

Cerate of spermaceti. L.

Take of spermaceti, half an ounce; white wax, two ounces; olive oil, four ounces. Melt them together, and stir until the cerate be cold.

This had formerly the name of *white cerate*, and it differs in nothing from the ointment of spermaceti, or white liniment, as it was formerly called, excepting in consistence, both the wax and the spermaceti bearing a greater proportion to the oil.

Lip-salve. Ross.

677 Take of olive oil, eighteen ounces; white wax, one pound; spermaceti, an ounce and a half; oil of rhodium, half a dram. Form a cerate, tinging it with alkanet, so as to give a red colour.

The name affixed to this cerate points out the use for which it is intended. It is chiefly employed against those chaps and excoriations of the lips, which are often the consequence of cold weather; and it is very well suited for removing affections of that kind. But excepting in the colour and smell which it derives from the alkanet and rhodium, it differs in nothing from the cerate of spermaceti, and cannot be considered as more effectually answering the intention in view.

Bougies. Succ.

678 Take of yellow wax, melted, one pound; spermaceti, three drams; vinegar of litharge, two drams. Mix them, and upon removal from the fire immerse into the mixture slips of linen, of which bougies are to be formed according to the rules of art. These may also be made with double, triple, or quadruple, the quantity of the vinegar.

It is perhaps rather surprising, that no formula for the preparation of bougies has a place in our pharmacopœias: for there can be no doubt, that although the preparation of them has hitherto been principally trusted to empirics; yet in the hand of the skilful practitioner they are of great service in combating obstinate affections. Although it has been pretended by some that their influence is to be ascribed to certain impregnations; yet it is on better grounds contended, that they act entirely on mechanical principles. The great object is therefore to obtain the union of a proper degree of firmness and flexibility. These qualities the above composition possesses; and it does not probably derive any material benefit from being prepared with an additional proportion of the vinegar of litharge.

CHAP. XXXIV. *Epithems.*

679 By epithems or cataplasms are in general understood those external applications which are brought to a due consistence or form for being properly applied, not by means of oily or fatty matters, but by water or watery fluids. Of these not a few are had recourse to in actual practice; but they are seldom prepared in the shops of the apothecaries; and in some of the best modern pharmacopœias no formulæ of this kind are introduced. The London college, however, although they have abridged the number of epithems, still retain a few. And it is not without some advantage that there are fixed forms for the preparation of them.

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Cataplasn of cummin. L.

Take of cummin-seed, one pound; bay-berries, dry leaves of water-germander, or scordium, Virginian snake-root, of each three ounces; cloves, one ounce. Rub them all together; and, with the addition of three times the weight of honey, make a cataplasn.

This is adopted into the present edition of the London pharmacopœia with very little alteration from the last. It was then intended as a reformation of the *theriaca Londinensis*, which for some time past has been scarcely otherwise used than as a warm cataplasn. In place of the numerous articles which formerly entered that composition, only such of its ingredients are retained as contribute most to this intention: but even the article from which it now derives its name, as well as several others which still enter it, probably contribute very little to any medical properties it may possess.

Mustard-cataplasn. L.

Take of mustard seed, powdered, crumb of bread, each half a pound; vinegar, as much as is sufficient. Mix, and make a cataplasn.

Epithems of this kind are commonly known by the name of *sinapisms*. They were formerly not unfrequently prepared in a more complicated state, containing garlic, black-soap, and other similar articles; but the above simple form will answer every purpose which they are capable of accomplishing. They are employed only as stimulants: they often inflame the part and raise blisters, but not so perfectly as cantharides. They are frequently applied to the soles of the feet in the low state of acute diseases, for raising the pulse and relieving the head. The chief advantage they have depends on the suddenness of their action.

Alum-curd. L.

Take the whites of two eggs; shake them with a piece of alum till they be coagulated.

This preparation is taken from Riverius. It is an useful astringent epithem for sore, moist eyes, and excellently cools and represses thin defluxions. Slighter inflammations of the eyes, occasioned by dust, exposure to the sun, or other similar causes, are generally removed by fomenting them with warm milk and water, and washing them with solutions of white vitriol. Where the complaint is more violent, this preparation, after the inflammation has yielded a little to bleeding, is one of the best external remedies. It is to be spread on lint, and applied at bed-time.

A TABLE, showing in what Proportions MERCURY or OPIUM enter different Formula.

Pulvis e creta compositus cum opio. L. In about forty-four grains, one grain of opium is contained.

Pulvis ipecacuanhæ compositus. L. In ten grains, one grain of opium.

Pulvis sudorificus. E. In eleven grains, one grain of opium.

Pulvis opiatus. L. In ten grains, one grain of opium.

Pulvis e scammonio cum calomelane. L. In four grains, one grain of calomel.

3 K

Pilula

Prepara-
tions and
Composi-
tions.

Pilula ex opio. L. In five grains, one grain of opium.
Pilula thebaica. E. In ten grains, one grain of opium.
Pilula ex hydrargyro. L. In two grains and a half, one grain of mercury.
Pilula ex hydrargyro. E. In four grains, one grain of mercury.
Pilula plummeri. E. In two grains and two-thirds, one grain of calomel.
Confectio opiata. L. In thirty-six grains, one grain of opium.
Electuarium Japonicum. E. In about one hundred and ninety-three grains, one grain of opium.
Electuarium Thebaicum. E. In ninety-seven grains, one grain of opium.
Trochisci bechici cum opio. E. In fifty-five grains, one grain of opium.
 These trochisci are not unfrequently ordered *cum duplici opio*, and under this form are kept in many shops.
Emplastrum ammoniacum cum hydrargyro. L. In five ounces, one ounce of mercury.
Emplastrum lythargyri cum hydrargyro. L. In five ounces, one ounce of mercury.
Emplastrum e hydrargyro. E. In three ounces and two-thirds, one ounce of mercury.
Unguentum hydrargyri fortius. L. In two drams, one dram of mercury.

Unguentum hydrargyri mitius. L. In five drams, one dram of mercury.
Unguentum ex hydrargyro. E. In five drams, one dram of mercury.
Unguentum hydrargyri nitrati. L. In one dram, four grains of nitrated quicksilver.
Unguentum citrinum. E. In one dram, four grains of nitrated quicksilver.
Unguentum calcis hydrargyri alba. L. In one dram, four grains and two-thirds of the calx hydrargyri alba.
Tinctura opii (L.) is made with opium, in the proportion of one grain to about thirteen of the menstruum.
Tinctura Thebaica (E.) is made with opium, in the proportion of one grain to twelve of the menstruum.
Tinctura opii camphorata (L.) is made with opium, in the proportion of one grain to two hundred and sixty of the menstruum.
Elixir paregoricum (E.) is made with opium, in the proportion of one grain to sixty-eight of the menstruum.
Balsamum anodynum (E.) is made with opium, in the proportion of one grain to about thirty of the menstruum.

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P H A

Pharos.

PHAROS, (Homer, Strabo, &c.), a small oblong island, adjoining to the continent of Egypt, over-against Alexandria. On this island stood a cognominal light-tower, of four sides, each side a stadium in length; and the tower so high as to be seen 100 miles off. Some affirm, each of its four corners rested on a large sea-crab of glass or of hard transparent stone of Ethiopia or Memphis. Others imagine the crabs were only added externally to the base by way of ornament, or as emblematical of its situation and use. The architect was Sostrates the Cnidian, as appears by an inscription on the tower, under Ptolemy Philadelphus, who laid out 800 talents upon it. On account of the port of Alexandria, the entrance to which was difficult and dangerous, the Pharos was called *the key of the Egyptian sea*, or even of Egypt itself (Lucan): and Pharos, from being a proper name, is become an appellative to denote all light-houses.

P H A

PHAROS, or *Phare*, a light-house; a pile raised near a port, where fire is kept burning in the night, to guide and direct vessels near at hand. The pharos of Alexandria, built in the island of Pharos, at the mouth of the Nile, was anciently very famous, inasmuch as to communicate its name to all the rest. This most magnificent tower consisted of several stories and galleries, with a lantern at top, in which a light being continually burning, might be seen for many leagues at sea, and along the coast. It was accounted one of the seven wonders of the world. It was built by the famed architect Sostrates, a native of Cnidos, or, according to some, by Deiphanes, the father of Sostrates; and cost Ptolemy Philadelphus 800 talents. The several stories were adorned with columns, ballustrades, galleries of the finest marble and workmanship; to which some add, that the architect had contrived to fasten some looking-glasses so artificially against the highest galleries,

Pharos.

Pharpar, galleries, that one could see in them all the ships that sailed on the sea for a great way. Instead of which noble structure, one sees now only a kind of irregular castle, without ditches or outworks of any strength, the whole being accommodated to the inequality of the ground on which it stands, and which it seems is no higher than that which it should command. Out of the midst of this clumsy building rises a tower, which serves for a light-house, but which hath nothing of the beauty and grandeur of the old one. The Colossus of Rhodes also served as a pharos.

PHARPAR, or **PHARPHAR**, is one of the rivers of Damascus, or rather it is an arm of the Barrady or Chrysorrhoeas, which waters the city of Damascus and the country about it (2 Kings v. 12.) "Are not Abana and Pharpar, rivers of Damascus, better than all the waters of Israel?" The river of Damascus has its fountain in the mountains of Libanus. At its approach to the city it is divided into three arms, one of which passes through Damascus. The other two water the gardens round about, and then reuniting, they lose themselves at four or five leagues from the city, towards the north. See *Maundrell's Travels from Aleppo to Jerusalem*; see also the articles **ABANA** and **DAMASCUS**.

PHARSALIA, **PHARSALIUM**, *Pharsalus*, or *Pharsalos*, (anc. geog.), a town of the Phthiotis, a district of Thessaly, near Pheræ and Larissa, to which last place Pompey fled from the plains of Pharsalus; watered by the river Enipeus, which falls into the Apidanus, and both together into the Peneus. Between Pharsalus and Enipeus, Pompey drew up his men at the fatal battle of Pharsalia.

In this battle, the advantage with respect to numbers was greatly on the side of Pompey. That general himself was on the left with the two legions which Cæsar had returned to him at the beginning of the war. Scipio, Pompey's father-in-law, was in the centre, with the legions he had brought from Syria, and the reinforcements sent by several kings and states of Asia. The Cilician legion, and some cohorts which had served in Spain, were in the right, under the command of Afranius. As Pompey's right wing was covered by the Enipeus, he strengthened the left with his slingers, archers, and the 7000 Roman horse, on whom chiefly his party founded their hopes of victory. The whole army was drawn up in three lines, with very little spaces between them. In conformity to this disposition, Cæsar's army was drawn up in the following order: The tenth legion, which had on all occasions signalized themselves above all the rest, was placed in the right wing, and the ninth in the left; but as the latter had been considerably weakened in the action at Dyrrhachium, the eighth legion was posted so near it as to be able to support and reinforce it upon occasion. The rest of Cæsar's forces filled up the space between the two wings. Marc Antony commanded the left wing, Sylla the right, and Cneius Domitius Calvinus the main body. As for Cæsar, he posted himself in the right over-against Pompey, that he might have him always in his sight.

Thus was the whole plain covered, from Pharsalia to the Enipeus, with two armies, dressed and armed after the same manner, and bearing the same ensigns, the Roman eagles. Pompey observing how well the

enemy kept their ranks, expecting quietly the signal of battle, and on the contrary how impatient and unsteady his own men were, running up and down in great disorder for want of experience, he began to be afraid lest his ranks should be broken upon the first onset; and therefore commanded the foot in the front to keep their ground, and quietly wait for the enemy. The two armies, though within reach of each other, kept a mournful silence; but at length the trumpets sounded the charge, and Cæsar's army advanced in good order to begin the attack, being encouraged by the example of one Caius Crastinus, a centurion, who at the head of 120 men threw himself upon the enemy's first line with incredible fury. This he did to acquit himself of a promise he had solemnly made to Cæsar, who, meeting him as he was going out of his tent in the morning, asked him, after some discourse, *What his opinion was touching the event of the battle?* To which he, stretching out his hand, replied aloud, *Thine is the victory, Cæsar; thou shalt gloriously conquer, and I myself this day will be the subject of thy praise either dead or alive.* In pursuance of this promise he broke out of his rank as soon as the trumpet sounded; and, at the head of his company, ran in upon the enemy, and made a great slaughter of them. But while he was still pressing forward, forcing his way through the first line, one of Pompey's men ran him in at the mouth with such violence, that the point of his sword came out at the hind part of his neck. Upon his death Pompey's soldiers took courage, and with great bravery stood the enemy's onset. While the foot were thus sharply engaged in the centre, Pompey's horse in the left wing marched up confidently; and having first widened their ranks, with a design to surround Cæsar's right wing, charged his cavalry, and forced them to give ground. Hereupon Cæsar ordered his horse to retreat a little, and give way to the six cohorts, which he had posted in the rear as a body of reserve. These, upon a signal given, coming up, charged the enemy's horse with that resolution and good order which is peculiar to men who have spent all their lives in camps. They remembered their instructions, not striking at the legs or thighs of the enemy, but aiming only at their faces. This unexpected and new manner of fighting had the desired effect. For the young patricians, whom Cæsar contemptuously calls the *pretty young dancers*, not being able to bear the thoughts of having their faces deformed with scars, turned their backs, and, covering their faces with their hands, fled in the utmost confusion, leaving the foot at the mercy of the enemy. Cæsar's men did not pursue the fugitives; but charging the foot of that wing, now naked and unguarded, surrounded them, and cut most of them in pieces.

Pompey was so transported with rage, in seeing the flower of his forces thus put to flight or cut in pieces, that he left his army, and retired slowly towards his camp, looking more like a man distracted and beside himself than one who by his exploits had acquired the name of *the Great*. When he had reached the camp, he retired to his tent without speaking a word to any; and continued there, like one distracted and out of his senses, till his whole army was defeated. Cæsar no sooner saw himself master of the field than

Pharsalia. he marched to attack the enemy's entrenchments, that Pompey might not have time to recollect himself. When Pompey was informed that his rival was advancing to attack his entrenchments, he then first seemed to have recovered his senses, and cried out, *What, into my camp too!* He said no more; but immediately laying aside the marks of his dignity, and putting on such a garment as might best favour his flight, he stole out at the decuman gate, and took the road to Larissa, which city had hitherto shown great attachment to him. In the mean time Cæsar began the attack on the enemy's camp, which was vigorously defended by the cohorts Pompey had left to guard it; but they were at length forced to yield. Cæsar was not a little surprised, when, after having forced the entrenchments, he found the enemy's tents and pavilions richly adorned with carpets and hangings, their couches strewed with flowers, their tables ready spread, and sideboards set out with abundance of plate, bowls, and glasses, and some of them even filled with wine. So great was the confidence of Pompey's party, that they made preparations before hand for pleasures to be enjoyed after the victory, which they thought certain. In Pompey's tent, Cæsar found the box in which he kept his letters: but, with a moderation and magnanimity worthy of himself, he burnt them all, without reading one; saying, that he had rather be ignorant of crimes, than obliged to punish them.

The next day, when the dead were numbered, it appeared that Cæsar had scarce lost 200 men; among whom was about 30 centurions, whom Cæsar caused to be buried with great solemnity. He did particular honours to the body of Crassus, who had begun the battle; and ordered his ashes to be deposited in a tomb, which he erected to his memory. On Pompey's side, the number of the dead amounted to 15,000 according to some, and to 25,000 according to others. Cæsar took 24,000 prisoners, eight eagles, and 180 ensigns.

Blair's
Lectures.

PHARSALIA, an epic poem, composed by Lucan on the civil war between Pompey and Cæsar, and particularly on the victory of the latter over the former, of which we have given an account in the preceding article. It is a poem universally acknowledged to have great beauties and great defects; but we are the less capable of estimating its merit as a whole, that either time has deprived us of the last books, or its author has left it incomplete. "The subject of the *Pharsalia* (says an excellent critic) carries undoubtedly all the epic grandeur and dignity: neither does it want unity of object, viz. the triumph of Cæsar over the Roman liberty. In the choice of that subject, he thinks, however, that the author was not happy. The civil wars were too recent to admit in the description of them the embellishments of fiction and machinery. The fables of the gods mixed with the exploits of Cæsar and Pompey, instead of raising, would have diminished, the dignity of such well known facts." Another objection to the subject, perhaps more forcible than this, arises from the success of the war and the abilities of the generals. Lucan was a friend to liberty, and wished to raise the character of Pompey and Cato; but in spite of his utmost efforts, they are always eclipsed by the superior talents and consequent success of Cæsar. All his characters, however, are drawn

with spirit, and with uncommon regard to truth; and some of the speeches which he puts into the mouths of his heroes are equal for moral sublimity to any thing that is to be found in all antiquity.

"There are in the *Pharsalia* (continues the critic already quoted) several very poetical and spirited descriptions. But the author's chief strength does not lie either in narration or description. His narration is often dry and harsh; his descriptions are often overwrought, and employed too upon disagreeable objects. His principal merit consists in his sentiments, which are generally noble and striking and expressed in that glowing and ardent manner which peculiarly distinguishes him. Lucan is the most philosophical and the most public-spirited poet of all antiquity. He was the nephew of the famous Seneca the philosopher; was himself a Stoic; and the spirit of that philosophy breathes throughout his poem. We must observe, too, that he is the only ancient epic poet whom the subject of his poem really and deeply interested. Lucan recounted no fiction. He was a Roman, and had felt all the direful effects of the Roman civil wars, and of that severe despotism which succeeded the loss of liberty. His high and bold spirit made him enter deeply into this subject, and kindle, on many occasions, into the most real warmth. Hence, he abounds in exclamations and apostrophes, which are almost always well timed, and supported with a vivacity and fire that do him no small honour.

"But it is the fate of this poet, that his beauties can never be mentioned, without their suggesting his blemishes also. As his principal excellency is a lively and glowing genius, which appears sometimes in his descriptions, and very often in his sentiments, his great defect in both is want of moderation. He carries every thing to an extreme. He knows not where to stop. From an effort to aggrandise his objects, he becomes tumid and unnatural: and it frequently happens, that where the second line of one of his descriptions is sublime, the third, in which he meant to rise still higher, is perfectly bombast. Lucan lived in an age when the schools of the declaimers had begun to corrupt the eloquence and taste of Rome. He was not free from the infection; and too often, instead of showing the genius of the poet, betrays the spirit of the declaimer; but he is, on the whole, an author of lively and original genius."

PHARUS, in botany: A genus of the hexandria order, belonging to the monœcia class of plants; and in the natural method ranking under the fourth order, *Gramina*. The male calyx is a bivalved uniflorous glume; the corolla, a bivalved glume; the female calyx the same with the male; the corolla an uniflorous, long, and wrapping glume. There is but one seed.

PHARYNX, in anatomy. See there, p. 708, 709.

PHASCUM, in botany: A genus of the order of *mulci*, belonging to the cryptogamia class of plants. The anthera is operculated, with a ciliated mouth; the calyptræ are minute.

PHASEOLUS, the KIDNEY-BEAN; a genus of the decandria order, belonging to the diadelphia class of plants. There is only one species; but of this there are many varieties. Those principally cultivated for the table are, 1. The common white, or Dutch kidney-bean.

Phaseolus. bean. 2. The smaller kidney-bean, commonly called the *Battersea kidney-bean*. And, 3. The upright sort, called the *tree kidney-bean*.

1. The first sort was some time ago propagated in England, and is still in Holland; it grows very tall, and requires long stakes and poles to climb on, and its beans are considerably broad: this makes them less saleable in the markets, people supposing them to be old because they are broad; and they are hence grown into disuse, though a much more valuable kind for eating than any other.

2. The second sort, or *Battersea bean*, is what is more universally cultivated: it never grows very tall, nor rambles far, and the air can easily pass between the rows, because of its moderate growth; and this makes it bear plentifully, and ripen well for the table. It is the best tasted bean, except the last.

3. The third, or *tree kidney bean*, is also a plentiful bearer, and never rambles, but grows up in form of a shrub; but its beans are broader than the *Battersea* kind, and are not so well tasted.

They are all propagated from seeds, which are to be put into the ground in the latter end of March or beginning of April for an early crop: but these should have a warm situation and a dry soil; they must also be planted in a dry season. The manner of planting them is, to draw lines with a bough over the bed, at two feet and a half distance, into which the seeds are to be dropped at about two inches asunder; and the earth is to be drawn over them with the head of a rake, to cover them about an inch deep. In a week after sowing, the plants will appear, and the earth should be drawn up about their stalks as they rise up; for a few days after this they will require no further care, except to be kept clear from weeds, and, when the beans appear, to have them gathered twice a-week; for if the beans are suffered to hang on too long, they not only become of no value, but they weaken the plant. The first crop of kidney-beans will continue a month in good order; and, to supply the table afterwards, there should be fresh sowings in March, April, May, and June; the last of which will continue till the frosts come to destroy them. Some raise their early crops on hot-beds; and this is to be done exactly in the same manner as the raising the early cucumbers.

A new species of *phaseolus*, apparently a very useful one, has been discovered by M. Moraney, "an inhabitant of Morne Rouge, dependant on the Cape;" we suppose Cape François of the island of St Domingo. In his search for plants, subservient to his collection of insects for the king's cabinet, he was overtaken by night, and he passed it in a cave, to which he had recourse for shelter. At its extremity he found beds of fossils, broken pieces of burnt earthen-ware, some tools and other things, which showed that this cave had formerly been the habitation of the natives. Near it he saw a climbing plant attached to some trees, with clusters of dry pods hanging from it. These he gathered, and on his return sowed the seed. Some months after, the plants grew tall and strong: they appeared to resemble a *phaseolus* known at Perpignan by the name of *caraquoëla*, and in the superb portfolios of the king by that of *phaseolus Indicus, cochleato flore*, which produced many roots, not unlike the ma-

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nioc. On examining the root after the pods were ripe, he found from three to eight roots of this kind. The force of the vegetation was wonderful; but dreading the deleterious effects of recent manioc, he did not taste them, but subjected them to a chemical analysis, which proved nothing. After boiling them in water a little salted, he ventured to taste them, and found them moist, unctuous, and saccharine, not unlike potatoes. He made, after some hours trial, very good cassava with them, without being incommoded by the disagreeable fibres which are met with in the manioc during this operation. Since that time, biscuit and bread have been made from these roots by M. Lombart counsellor at the Cape. The plant has been found to be very common in the woods. It requires no peculiar management: its roots are in season when the pods blacken, and its fibres run in every direction, searching for nourishment through the clefts of rocks, and receiving the impression of the strata without injury. If the principal root is left, the plant shoots again and flourishes as before; but it is not yet ascertained whether it puts forth any new roots. The seeds are not alimentary when dressed, as if nature designed them only for propagating other plants. Every use which a farinaceous plant can supply; this new *phaseolus* has successfully answered; and the seeds in the hands of Messrs Heretier and Thouin will probably furnish a sufficient quantity for curiosity as well as use.

PHASES, in astronomy, from the Greek word *φαῖς*, "to appear;" the several appearances or quantities of illumination of the moon, Venus, Mercury, and the other planets. See ASTRONOMY.

PHASGA, or PISGAH, (Moses), a mountain on the other side Jordan, joined to Abarim and Nebo, and running south to the mouth of the Arnon: from which Moses had a view of the promised land, and where he died, having before appointed Joshua his successor. Wells takes Pisgah and Nebo to be different names of one and the same mountain, a part or branch of the mountains Abarim, (Deut. xxxii. 49. compared with Deut. xxxiv. 1.) Or that the top of Nebo was peculiarly called *Pisgah*; or some other part of it, cut out in steps, as the primitive word denotes: and thus it is rendered by Aquila, by a Greek word signifying *cut out* (Jerome). There was also a city of this name, *id.*; and the adjoining country was in like manner called *Pisgah, id.*

PHASIANUS, in ornithology, a genus belonging to the order of gallinæ. The cheeks are covered with a smooth naked skin.

Gibbons, in his Roman History, tells us, that the name *Phasianus* is derived from the river PHASIS, the banks of which is the native habitation of the pheasant. See PHASIS.

1. The gallus, or common dunghill cock and hen, with a compressed caruncle or fleshy comb on the top of the head, and a couple of caruncles or wattles under the chin. The ears are naked, and the tail is compressed and erected. Of all other birds, perhaps this species affords the greatest number of varieties; there being scarce two to be found that exactly resemble each other in plumage and form. The tail, which makes such a beautiful figure in the generality of these birds, is yet found entirely wanting in others; and not only

Phases
Phasianus.

Dung-hill
cock.

Phasianus.

the tail, but the rump also. The toes, which are usually four in all animals of the poultry kind, yet in a species of the cock are found to amount to five. The feathers, which lie so sleek and in such beautiful order in most of those we are acquainted with, are in a peculiar breed all inverted, and stand staring the wrong way. Nay, there is a species that comes from Japan, which instead of feathers seems to be covered over with hair.

It is not well ascertained when the cock was first made domestic in Europe; but it is generally agreed that we first had him in our western world from the kingdom of Persia. Aristophanes calls the cock the *Persian bird*; and tells us he enjoyed that kingdom before some of its earliest monarchs. This animal was in fact known so early even in the most savage parts of Europe, that we are told the cock was one of the forbidden foods among the ancient Britons. Indeed, the domestic fowl seems to have banished the wild one. Persia itself, that first introduced it to our acquaintance, seems no longer to know it in its natural form; and if we did not find it wild in some of the woods of India, as well as those of the islands in the Indian ocean, we might begin to doubt, as has been done with regard to sheep, in what form it first existed in a state of nature. But the cock is still found in the islands of Tinian, in many others of the Indian ocean, and in the woods on the coast of Malabar, in its ancient state of independence. In his wild condition, his plumage is black and yellow, and his comb and wattles yellow and purple. There is another peculiarity also in those of the Indian woods; their bones, which, when boiled, with us are white, as every body knows, in those are as black as ebony.

In their first propagation in Europe, there were distinctions then that now subsist no longer. The ancients esteemed those fowls whose plumage was reddish as invaluable; but as for the white, it was considered as utterly unfit for domestic purposes. These they regarded as subject to become a prey to rapacious birds; and Aristotle thinks them less fruitful than the former. Indeed, his division of those birds seems taken from their culinary uses: the one sort he calls *generous and noble*, being remarkable for fecundity; the other sort, *ignoble and useless*, from their sterility. These distinctions differ widely from our modern notions of generosity in this animal; that which we call the *game-cock* being by no means so fruitful as the ungenerous dunghill cock, which we treat with contempt. The Athenians had their cock-matches as well as we; but it is probable they did not enter into our refinement of choosing out the most barren of the species for the purposes of combat.

However this be, no animal in the world has greater courage than the cock when opposed to one of his own species; and in every part of the world where refinement and polished manners have not entirely taken place, cock-fighting is a principal diversion. In China, India, the Philippine islands, and all over the East, cock-fighting is the sport and amusement even of kings and princes. With us it is declining every day; and it is to be hoped it will in time become only the pastime of the lowest vulgar. See the article *Cock-pit*.

The cock claps his wings before he sings or crows. His sight is very piercing; and he never fails to cry in a

peculiar manner, when he discovers any bird of prey in the air. His extraordinary courage is thought to proceed from his being the most salacious of all other birds whatsoever. A single cock suffices for ten or a dozen hens; and it is said of him that he is the only animal whose spirits are not abated by indulgence. But then he soon grows old; the radical moisture is exhausted; and in three or four years he becomes utterly unfit for the purposes of impregnation. "Hens also (to use the words of Willoughby), as they for the greatest part of the year daily lay eggs, cannot suffice for so many births, but for the most part after three years become effete and barren: for when they have exhausted all their seed-eggs, of which they had but a certain quantity from the beginning, they must necessarily cease to lay, there being no new ones generated within."

The hen seldom clutches a brood of chickens above once a season, though instances have been known in which they produced two. The number of eggs a domestic hen will lay in the year are above 200, provided she be well fed and supplied with water and liberty. It matters not much whether she be trodden by the cock or no; she will continue to lay, although the eggs of this kind can never by hatching be brought to produce a living animal. Her nest is made without any care, if left to herself; a hole scratched into the ground, among a few bushes, is the only preparation she makes for this season of patient expectation. Nature, almost exhausted by its own fecundity, seems to inform her of the proper time for hatching, which she herself testifies by a clucking note, and by discontinuing to lay. The good housewives, who often get more by their hens laying than by their chickens, often artificially protract this clucking season, and sometimes entirely remove it. As soon as a hen begins to cluck, they stint her in her provisions; which, if that fails, they plunge her into cold water; this, for the time, effectually puts back her hatching; but then it often kills the poor bird, who takes cold and dies under the operation.

If left entirely to herself, the hen would seldom lay above 20 eggs in the same nest, without attempting to hatch them: but in proportion as she lays, her eggs are removed; and she continues to lay, vainly hoping to increase the number. In the wild state, the hen seldom lays above 15 eggs; but then her provision is more difficultly obtained, and she is perhaps sensible of the difficulty of maintaining too numerous a family.

When the hen begins to sit, nothing can exceed her perseverance and patience; she continues for some days immovable; and when forced away by the importunities of hunger, she quickly returns. Sometimes also her eggs become too hot for her to bear, especially if she be furnished with too warm a nest within doors, for then she is obliged to leave them to cool a little: thus the warmth of the nest only retards incubation, and often puts the brood a day or two back in the shell. While the hen sits, she carefully turns her eggs, and even removes them to different situations; till a length, in about three weeks, the young brood begin to give signs of a desire to burst their confinement. When by the repeated efforts of their bill, which serves like a pioneer on this occasion, they have broke themselves a passage through the shell, the hen still continues to sit

Phasianus.
Domestic
hen.

till

Phasianus till all are excluded. The strongest and best chickens generally are the first candidates for liberty; the weakest come behind, and some even die in the shell. When all are produced, she then leads them forth to provide for themselves. Her affection and her pride seem then to alter her very nature, and correct her imperfections. No longer voracious or cowardly, she abstains from all food that her young can swallow, and flies boldly at every creature that she thinks is likely to do them mischief. Whatever the invading animal be, she boldly attacks him; the horse, the hog, or the mastiff. When marching at the head of her little troop, she acts the commander; and has a variety of notes to call her numerous train to their food, or to warn them of approaching danger. Upon one of these occasions, the whole brood have been seen to run for security into the thickest part of an hedge, while the hen herself ventured boldly forth, and faced a fox that came for plunder.

Ten or twelve chickens are the greatest number that a good hen can rear and clutch at a time; but as this bears no proportion to the number of her eggs, schemes have been imagined to clutch all the eggs of an hen, and thus turn her produce to the greatest advantage. By these contrivances it has been obtained, that a hen that ordinarily produces but 12 chickens in the year, is found to produce as many chickens as eggs, and consequently often above 200. This contrivance is the artificial method of HATCHING chickens in stoves, as is practised at Grand Cairo; or in a chemical laboratory properly graduated, as has been effected by Mr Reaumur. At Grand Cairo, they thus produce 6000 or 7000 chickens at a time; where, as they are brought forth in their mild spring, which is warmer than our summer, the young ones thrive without clutching. But it is otherwise in our colder and unequal climate; the little animal may without much difficulty be hatched from the shell, but they almost all perish when excluded. To remedy this, Reaumur has made use of a woollen hen, as he calls it; which was nothing more than putting the young ones in a warm basket, and clapping over them a thick woollen canopy.

Capons may very easily be taught to clutch a fresh brood of chickens throughout the year; so that when one little colony is thus reared, another may be brought to succeed it. Nothing is more common than to see capons thus employed; and the manner of teaching them is this: First the capon is made very tame, so as to feed from one's hand; then, about evening, they pluck the feathers off his breast, and rub the bare skin with nettles; they then put the chickens to him, which presently run under his breast and belly, and probably rubbing his bare skin gently with their heads, allay the stinging pain which the nettles had just produced. This is repeated for two or three nights, till the animal takes an affection to the chickens that have thus given him relief, and continues to give them the protection they seek for: perhaps also the querulous voice of the chickens may be pleasant to him in misery, and invite him to succour the distressed. He from that time brings up a brood of chickens like a hen, clutching them, feeding them, clucking, and performing all the functions of the tenderest parent. A capon once accustomed to this service, will not give over; but when one brood is grown up, he may have another nearly

hatched put under him, which he will treat with the same tenderness he did the former. *Phasianus*

The cock, from his salaciousness, is allowed to be a short-lived animal; but how long these birds live, if left to themselves, is not yet well ascertained by any historian. As they are kept only for profit, and in a few years become unfit for generation, there are few that, from mere motives of curiosity, will make the tedious experiment of maintaining a proper number till they die. Aldrovandus hints their age to be 10 years; and it is probable that this may be its extent. They are subject to some disorders; and as for poisons, besides nux vomica, which is fatal to most animals except man, they are injured, as Linnaeus asserts, by elderberries; of which they are not a little fond.

Of this species Mr Latham enumerates no less than 13 varieties, beginning with the wild cock, which is a third less in the body than the domestic cock. This variety he imagines to be the original stock from whence all our domestic varieties have sprung. They appear to be natives of the forests of India. There are but few places, however, as Mr Latham goes on to observe, where the different voyagers have not met with cocks and hens, either wild or tame; and mention has been particularly made of finding them at St Jago, Pulo Condore, Isle of Timor, Philippine and Molucca Isles, Sumatra and Java, New Guinea, Tinian, and most of the isles of the South Seas. — Those of Pulo Condore are very much like our own, but considerably less, being only of the size of a crow. The cocks crow like ours, but their voices are much more small and shrill. — *Damp. Voy.* vol. i. p. 392. — Two wild ones were shot there by our last voyagers. — *Ellis's Narr.* ii. p. 340. Those of Sumatra and Java are remarkably large, and are called the *St Jago breed*. The cock is so tall as to peck off a common dining-table. When fatigued, he sits down on the first joint of the leg; and is then taller than the common fowls. *Hist. Sumatr.* p. 98. They are found in New Guinea, but not in great plenty. — *Forr. Voy.* p. 105. The fowls which were met with wild at Tinian “were run down without much trouble, as they could scarce fly farther than 100 yards at a flight.” — *Anson's Voy.* p. 416. Forster observes, that they are plenty at Easter, Society, and Friendly Isles: at the two last they are of a prodigious size. They are not uncommon at the Marquesas, Hebrides, and New Caledonia; but the Low Isles are quite destitute of them. — See *Obs.* p. 193. — Ducks and poultry are numerous in the Sandwich Isles. — *Cook's Journal*, p. 229. In respect to Europe, little need be said, as varieties without end are everywhere seen, and their manners fully known to every one. It is observed, however, that they breed most freely in the warmer situations. In the very cold regions, though they will live and thrive, they cease to multiply. They are not found to breed in the northern parts of Siberia; and in Groenland are only kept as rarities. — *Faun. Groen.* On the whole, it seems quite unnecessary to enlarge further on a subject well known to every body. They are so common, that every one who wishes to become acquainted with their nature and manners, has the means of such knowledge in his power. Those who wish for minuter descriptions, we must refer to the authors

Phasianus. who have professedly written on the subject; for the varieties which we have already mentioned, we refer to Mr Latham.

Pheasants. 2. The motmot, or Guinea pheasant, is brownish, somewhat red below, with a wedge-like tail, and wants spurs. 3. The colchicus is red, with a blue head, a wedge-shaped tail, and papillous cheeks. It is a native of Africa and Asia. 4. The argus is yellowish, with black spots, a red face, and a blue crest on the back part of the head. It is found in Chinese Tartary. 5. The pictus has a yellowish crest, a red breast, and a wedge-shaped tail. It is a native of China. 6. The necthemerus is white, with a black crest and belly, and a wedge-shaped tail. It is a native of China.

Mr Latham enumerates nine different species of pheasants, and of the common pheasant he reckons six varieties. The first which he describes is the superb pheasant. This bird Linnaeus described from the various representations of it painted on paper-hangings and China-ware; and farther confirmed by a figure and description in a Chinese book which came under his inspection.

*Latham's
Synopsis.*

"We have lately seen (says Latham) a drawing of the tail feather of a bird of the pheasant kind, which measured above six feet in length, and which, it is probable, must have belonged to some bird not hitherto come to our knowledge. The drawing is in the possession of Major Davies, who took it from the original feather; two of which were in the possession of a gentleman of his acquaintance, and were brought from China. They are exactly in shape of the two middle feathers of the painted pheasant; the general colour is that of a fine blue grey, margined on the sides with a rufous cream-colour, and marked on each side the shaft with numerous bars of black; between 70 and 80 bars in all; those on the opposite sides of the shaft seldom corresponding with each other.

"The argus, though it be a native of China, is very commonly found in the woods of Sumatra, where it is called *coo-ow*. It is found extremely difficult to be kept alive for any considerable time after catching it in the woods; never for more than a month. It seems to have an antipathy to the light, being quite inanimate in the open day; but when kept in a dark place, it appears perfectly at ease, and sometimes makes its note or call, from which it takes its name; and which is rather plaintive, and not harsh like that of a peacock. The flesh resembles that of the common pheasant."

Mr Latham observes, that the common pheasant is now found in a state of nature in almost the whole of the Old Continent. They sometimes (he says) come into farm yards near woods, and produce cross breeds with common hens. He then says, "M. Salerne remarks, that the hen-pheasant, when done laying and sitting, will get the plumage of the male, and after that become so little respected by him, as to be treated with the same incivility as he would show to one of his own sex. He mentions this as a new observation; but it is far more common than may be generally supposed, and had been long before mentioned by Edwards, who gave for example one kept in the menagery of the duke of Leeds; and remarks, that this change is most likely to happen when in a con-

finer state. The circumstance of the hen acquiring the plumage of the cock after a certain time is not confined to the pheasant: the instance of the pea-hen belonging to Lady Tynte, now in the Leverian Museum, evinces the contrary, which, after having many broods, got much of the fine plumage of the cock, with the addition even of the fine train feathers. The female also of the rock manakin is said to get the plumage of the opposite sex after a number of years; and perhaps, if observed hereafter, this may be found to be the case with many other species. A gentleman of my acquaintance (continues our author), dead long since, who used to keep these birds for his amusement, observed the same to me; and the ingenious Mr J. Hunter has a well drawn up paper in the *Philosophical Transactions* * to the same purport; but, in * Vol. lxx. addition to this, I am well informed, that it does not P. 527. always require mature age to give the hen-pheasant the appearance of the male, as sometimes young birds will be adorned with his fine plumage. I will not say how this happens, and whether it may be peculiar to this species to grow barren (if that be the reason) sooner than any other of the gallinaceous tribe; but I am assured that several of these spurless, cock-like hens, have proved on eating to be young birds, from their juiciness and delicacy of flavour."

One of the varieties which our author remarks under this species, he calls the *Hybridal pheasant*, which is a mixed breed between the pheasant and cock; one of which is in the Leverian Museum. The two last species which our author describes, is the parraka and courier.

The parraka is about the size of a small fowl, resembling it in the bill, legs, and body. Its length is 23 inches. The colour of the bill is dark rufous; the eyes are brown; the general colour of the plumage is a deep brown on the back, and fulvous under the belly: the top of the head is fulvous, and the feathers are somewhat long, but not so much as to form a real crest; the wings are short; the webs of some of the quills are somewhat rufous; the tail consists of 12 feathers, is even at the end, about a foot in length, and is, for the most part, carried pendent; the legs are of a dark rufous, inclining to black; the claws are like those of a fowl.

"It is peculiar (says Mr Latham) in its internal structure in respect to the windpipe; which, instead of entering directly the breast, as in most birds, passes over the side of the left clavicle, and on the outside of the fleshy part of the breast, being covered only by the skin, then taking a turn upwards, passes over the right clavicle into the breast, and is distributed through the lungs in the usual way. The female has not this circumvolution of the windpipe. The hannequaw, mentioned by Bancroft, is probably the same bird. He says that it is black, roosts in trees, and may be heard early in the morning, distinctly, but hoarsely, repeating the word *hannequaw* (easily mistaken for parrequaw) very loud. These are found in the unfrequented woods of the internal parts of Cayenne, Guiana, and many parts of South America. At sun-rise they set up a very loud cry, which is thought to be the loudest of all birds in the new world; at which time the eyes appear red, as does a small skin under the breast, which is not at all seen, except when the bird

Phasianus. bird makes such exertions, or is angry. This cry is very like the word *parraquaw*; and is repeated many times together; and often many cry at once, or answer one another, but most in breeding-time, which is twice in the year; at each time laying from four to six eggs; making the nest in low branches or stumps of trees, and behaving with their chickens in the same manner as hens. They feed on grain, seeds, and herbs; but feed the young in the nest with worms and small insects. These, with many other birds, inhabit the woods by day, coming out into the open savannas morning and evening to feed; at which times they are chiefly killed by the natives and near inhabitants. They may be brought up tame; and their flesh is much esteemed.

"The courier pheasant is but very imperfectly described by Fernandez; and is said to be 18 inches long. The general colour of the plumage is white, inclined to fulvous; about the tail they are black, mixed with some spots of white; the tail itself is long, and of a green colour, reflecting in some lights like the feathers of a peacock: the wings are short. This species inhabits the hotter parts of Mexico; flies slow; but is recorded to outrun the swiftest horse*."

* *Hist. des Indes.*

Pheasants were originally brought into Europe from the banks of the Phasis, a river of Colchis, in Asia Minor; and from whence they still retain their name. Next to the peacock, they are the most beautiful of birds, as well for the vivid colour of their plumes as for their happy mixtures and variety. It is far beyond the power of the pencil to draw any thing so glossy, so bright, or points so finely blending into each other. We are told, that when Cræsus, king of Lydia, was seated on his throne, adorned with royal magnificence and all the barbarous pomp of eastern splendor, he asked Solon if he had ever beheld any thing so fine? The Greek philosopher, no way moved by the objects before him, or taking a pride in his native simplicity, replied, That after having seen the beautiful plumage of the pheasant, he could be astonished at no other finery.

These birds, tho' so beautiful to the eye, are not less

delicate when served up to the table. Their flesh is considered as the greatest dainty; and when the old physicians spoke of the wholesomeness of any viands, they made their comparison with the flesh of the pheasant. However, notwithstanding all these perfections to tempt the curiosity or the palate, the pheasant has multiplied in its wild state.

A spirit of independence seems to attend the pheasant even in captivity. In the woods, the hen-pheasant lays from 18 to 20 eggs in a season; but in a domestic state, she seldom lays above 10. In the same manner, when wild, she hatches and leads up her brood with patience, vigilance, and courage; but when kept tame, she never sits well, so that a hen is generally her substitute upon such occasions: and as for leading her young to their food, she is utterly ignorant of where it is to be found; and the young birds starve, if left solely to her protection. The pheasant, therefore, on every account, seems better left at large in the woods than reclaimed to pristine captivity. Its fecundity when wild is sufficient to stock the forest; its beautiful plumage adorns it; and its flesh retains a higher flavour from its unlimited freedom.

However, it has been the aim of late to take these birds once more from the woods, and to keep them in places fitted for their reception. Like all others of the poultry kind, they have no great sagacity, and suffer themselves easily to be taken. At night they roost upon the highest trees of the wood; and by day they come down into the lower brakes and bushes, where their food is chiefly found. They generally make a kind of flapping noise when they are with the females; and this often apprises the sportsman (A) of their retreats. At other times he traces them in the snow, and frequently takes them in springs. But of all birds they are shot most easily; as they always make a whirring noise when they rise, by which they alarm the gunner, and being a large mark, and flying very slow, there is scarce any missing them.

When these birds are taken young into keeping, they become as familiar as chickens: and when they are designed for breeding, they are put together in a yard,

(A) Pheasants may be taken in a variety of ways. One method is, to be well acquainted with their haunts and breeding-places; which are generally young, thick, and well-grown coppices, free from the disturbances of cattle, and without a path-way through them; for they are timorous birds. When their haunts are discovered, it will next be necessary to find out where the brood is. And here it is to be remarked, that pheasants come out of the wood three times a-day to feed in green corn, fresh pastures, or such like places. The times of coming out are in the morning soon after sunrise, at noon, and at sunset. The sides of the wood where they may be supposed to come out ought then to be carefully watched, and the young ones will be seen following the female as a flock of chickens follow the hen. The wood ought also to be watched in the evenings, when the noise of the cock and hen calling the young ones together will soon be heard; and the sportsman must then endeavour to get as near as he can to the place; and being very still and silent, he may observe their numbers and disposition, and learn how to spread his nets so as most easily to take the whole brood; but if by the least motion they discover him, they will all take to their legs, and run to a great distance; for they seldom rise on the wing, except when very close frightened. By practice some people have become able to imitate the voice of the old pheasant, so as to be able to call the young ones together to any place that he pleases, when the haunts are once found out, and by this means they are easily led into the nets.—The best time for using this call is in the morning or evening; and the note imitated should be that by which they are called out to feed; indeed, by learning to imitate the other notes, they may be brought together at any time of the day. The sportsman who can make this call, must shelter himself in some close place, and begin very softly at first; then, if none are near enough to be within hearing, he is gradually to raise it louder and louder, and at length he will be answered as loud, if any are within hearing, though at a considerable distance;

Phasianus.

yard, five hens to a cock ; for this bird, like all of the poultry kind, is very salacious. In her natural state the female makes her nest of dry grass and leaves: the same must be laid for her in the pheasandry, and she herself will sometimes properly dispose them. If she refuses to hatch her eggs, then a common hen must be got to supply her place, which task she will perform with perseverance and success. The young ones are very difficult to be reared (B) ; and they must be supplied with ants-eggs, which is the food the old one leads them to gather when wild in the woods. To make these go the farther, they are to be chopped up with curds or other meat ; and the young ones are to be fed with great exactness, both as to the quantity and the time of their supply. This food is sometimes also to be varied ; and wood-lice, earwigs, and other insects, are to make a variety. The place where they are reared must be kept extremely clean ; their water must be changed twice or thrice a-day ; they must not be exposed till the dew is off the ground in the morning, and they should always be taken in before sunset. When they become adult, they very well can shift for themselves ; but they are particularly fond of oats and barley.

In order to increase the breed, and make it still more valuable, Longolius teaches us a method that appears very peculiar. The pheasant is a very bold bird when first brought into the yard among other poultry, not sparing the peacock, nor even such young cocks and hens as it can master ; but after a time it will live tamely among them, and will at last be brought to couple with a common hen. The breed thus produced take much stronger after the pheasant than the hen ; and in a few successions, if they be let to breed with the cock-pheasant (for the mixture is not barren), there will be produced a species more tame, stronger, and more prolific ; so that he adds, that it is strange why most of our pheasandries are not stocked with birds produced in this manner.

The pheasant, when full grown, seems to feed indifferently upon every thing that offers. It is said by a French writer, that one of the king's sportsmen shooting at a parcel of crows that were gathered round a dead carcase, to his great surprise, upon coming up, found that he had killed as many pheasants as crows. It is even asserted by some, that such is the carnivorous disposition of this bird, that when several of them are put together in the same yard, if one of them

stance ; whereas, if he should set up the call too loud at first, and any of the birds should happen to be very near, they would be frightened away.

When a pheasant answers, the sportsman is to creep nearer and nearer, still calling, though not so loud ; and he will still be answered, till at length he will be led by the bird's voice within sight of it. Then he is to spread his net, and to begin to call again, keeping in some close and well sheltered place behind the net ; in this place he is to call till the bird approaches ; and when he has drawn it under the net, he is to appear suddenly, and the bird, rising up, will thus be caught.

There is another method of taking pheasants much quicker than that we have just described, viz. the having a live cock-pheasant to use as a stake : this bird is to be fixed under the net, and by his crowing he will soon entice others in. The sportsman must lie concealed ; and when another pheasant comes in, he is to draw the net over him. Many people take pheasants in springes or horse-hair snares : to succeed in this, it will be necessary to be careful in searching out their haunts, and the places by which they go out of the woods into the fields. When these are discovered, a peg must be fixed in the ground at each, and at each peg two springes must be laid open ; the one to take in the legs, the other the head. When the springes are set, the sportsman must go into the woods, and get behind the birds in order to fright them with some little noise, such as shall not be enough to raise them to the wing, but only to set them a-running. They will naturally make their way out of the wood, through their accustomed passes, and be then caught in the springes.

There is another method of taking these birds in winter, provided there be no snow. This must be done with a net made in the form of a casting net, but with wider meshes ; they may indeed be five inches wide. Some peas or wheat are to be taken out ; and the path of the pheasants being discovered, which may easily be done by their dung, a pint or thereabout of corn is to be thrown down in the path in a place marked, so that the sportsman can come to it again. This must be done for some days, till at length the pheasants will expect it every day regularly ; and all of them that frequent the place are brought together to feed there, and then the net is to be fixed over the place ; its top being tied up to some bough of a tree, and its bottom fixed down all around, except in one place, where the walk of the pheasants lies. In this place it must be raised in the form of an arch, and the entrance must be lined with several rods of hazel ; the thick ends of which are to be tied to the net, and the thin ones let into the space covered by it ; and thus the pheasants will easily get in by parting the small ends of the sticks, as fish into a wheel, but they will not easily get out again. The nets are to be dyed of a russet colour, by laying them in a tan-pit ; and they must, when planted for this purpose, be covered with boughs, so that the birds do not discover them, and then they will easily run into them, and be all taken at once.

(B) The pheasant is so nearly allied to our common poultry that this assertion may appear odd : it is nevertheless true ; and the principal cause may be, that their proper food is not known, or not sufficiently inquired into. They feed voraciously on ants and various other insects ; and it is said, that when the multiness of corn or want of cleanness in their apartments has made them sick, a repast of ants has recovered them. When these fail, millepedes and earwigs together answer as an excellent medicine, along with their common food (corn), which must be very sweet and clean. These birds are very sullen, and when coupling time is over, they are seldom found more than one in a place.

Phasis || them happens to fall sick, or seems to be pining, all the rest will fall upon, kill, and devour it. Such is the language of books; those who have frequent opportunities of examining the manners of the bird itself, know what credit ought to be given to such an account.

*Decline and
Fall of the
Roman Em-
pire.*

PHASIS, a river which falls into the Euxine sea about 700 miles from Constantinople. "From the Iberian Caucasus (says Gibbon), the most lofty and craggy mountains of Asia, that river descends with such oblique vehemence, that in a short space it is traversed by 120 bridges. Nor does the stream become placid and navigable till it reaches the town of Sarapana, five days journey from the Cyrus, which flows from the same hills, but in a contrary direction, to the Caspian lake. The proximity of these rivers has suggested the practice, or at least the idea, of wafting the precious merchandise of India down the Oxus, over the Caspian, up the Cyrus, and with the current of the Phasis into the Euxine and Mediterranean seas. As it successively collects the streams of the plain of Colchos, the Phasis moves with diminished speed, tho' accumulated weight. At the mouth it is 60 fathoms deep, and half a league broad; but a small woody island is interposed in the midst of the channel: the water, so soon as it has deposited an earthy or metallic sediment, floats on the surface of the waves, and is no longer susceptible of corruption. In a course of 100 miles, 40 of which are navigable for large vessels, the Phasis divides the celebrated region of Colchos or Mingrelia, which, on three sides, is fortified by the Iberian and Armenian mountains, and whose maritime coast extends about 200 miles, from the neighbourhood of Trebizond to Dioscurias and the confines of Circassia. Both the soil and climate are relaxed by excessive moisture: 28 rivers, besides the Phasis and his dependent streams, convey their waters to the sea; and the hollowness of the ground appears to indicate the subterraneous channels between the Euxine and the Caspian."

PHASMATA, in physiology, certain appearances arising from the various tinctures of the clouds by the rays of the heavenly bodies, especially the sun and moon. These are infinitely diversified by the different figures and situations of the clouds, and the appulses of the rays of light; and, together with the occasional flashings and shootings of different meteors, they have, no doubt, occasioned those prodigies of armies fighting in the air, &c. of which we have such frequent accounts in most sorts of writers. See 2 Maccab. xi. 8. Melaneth. Meteor. 2 Shel. de Comet. ann. 1618.

Kircher and Schottus have erroneously attempted to explain the phenomenon from the reflection of terrestrial objects made on opaque and congealed clouds in the middle region of the air, which, according to them, have the effect of a mirror. Thus, according to these authors, the armies pretended by several historians to have been seen in the skies, were no other than the reflection of the like armies placed on some part of the earth. See Hist. Acad. Roy. Scienc. ann. 1726, p. 405, & seq.

PHASSACHATES, in natural history, the name of a species of agate, which the ancients, in its various appearances, sometimes called *leucachates* and *perileucos*.

PHEASANT, in ornithology. See PHASIANUS.

PHEASANT's-eye, or Bird's-eye. See ADONIS.

PHEBE, a deaconess of the port of Corinth, called *Cenchrea*. St Paul had a particular esteem for this holy woman; and Theodoret thinks the apostle lodged at her house for some time, while he continued in or near Corinth. It is thought she brought to Rome the epistle he wrote to the Romans, wherein she is commended and recommended in so advantageous a manner. He says (Rom. xvi. 1, 2.), "I commend unto you Phebe our sister, which is a servant of the church which is at Cenchrea: that ye receive her in the Lord, as becometh saints, and that ye assist her in whatsoever business she hath need of you; for she hath been a succourer of many, and of myself also." Some moderns have advanced a notion, that Phebe was wife to St Paul; but none of the ancients have said any thing like it. It is thought, in quality of deaconess, she was employed by the church in some ministrations suitable to her sex and condition; as to visit and instruct the Christian women, to attend them in their sickness, and distribute alms to them.

PHEGOR, or **PEOR**, a deity worshipped at a very early period by the Midianites and Moabites, and probably by all the other tribes which then inhabited Syria. Much has been said concerning the functions of this god, and the rank which he held among the Pagan divinities (see *BAAL-PEOR*); and many conjectures have been formed concerning the origin of his name. Most of these seem to have no better foundation than the senseless dreams of the Jewish rabbies. **PHEGOR**, or **PEOR**, is undoubtedly the same with the Hebrew word *pechor*, which signifies *aperuit*, and probably refers to the prophetic influence always attributed to the solar deity, by which he *opened* or *discovered* things to come. Accordingly we find **PHEGOR** or **PEOR** generally joined to *Baal*, which was the Syrian and Chaldean name of the sun after he became an object of worship; hence *Baal-PHEGOR* must have been the sun worshipped by some particular rites, or under some particular character. What these were, a resolution of *Pechor* into its component parts may perhaps inform us. As this word, wherever it occurs in Scripture, has some relation to distending or opening the mouth wide, it is probably compounded of **PHAH** the *mouth* or *face*, and **EHAR** *naked*. In those countries we know that the women wore veils; but it would appear, that in celebrating the rites of this deity they were unveiled. It seems even not improbable, that on these occasions the sexes danced promiscuously without their clothes; a practice which would naturally give birth to the licentious amours mentioned in the 25th chapter of the book of Numbers. If this be admitted, it will follow that *Phegor* was the sun presiding over the mysteries of Venus.

PELLANDRIUM, **WATER-HEMLOCK**; a genus of the digynia order, belonging to the pentandria class of plants. There are two species, one of which, viz. the aquaticum, is a native of Britain. This grows in ditches and ponds, but is not very common. The stalk is remarkably thick and dichotomous, and grows in the water. It is a poison to horses, bringing upon them, as Linnæus informs us, a kind of palsy; which, however, he supposes to be owing not so much to the noxious qualities of the plant itself, as to those of an

Pheasant

Phellandrium.

Phengites
||
Phere-
crates.

insect which feeds upon it, breeding within the stalks, and which he calls *curculio paraplecticus*. The Swedes give swine's dung for the cure. The seeds are sometimes given in intermittent fevers, and the leaves are by some added to discutient cataplasms. In the winter, the roots and stem, disaffected by the influence of the weather, afford a very curious skeleton or network. Horses, sheep, and goats, eat the plant; swine are not fond of it; cows refuse it.

Hill's Hist.
of Fossils,
p. 490.

PHENGITES, among the ancients, the name of a beautiful species of alabaster. It is a rude irregular mass, very shattery and friable, but of a brightness superior to that of most other marbles, and excelling them all in transparence. The colour is an agreeable pale, yellowish, white, or honey colour; the yellowish is more intense in some places than in others, and sometimes makes an obscure resemblance of veins. It is very weak and brittle in the mass; and when reduced to small pieces, may be easily crumbled between the fingers into loose, but considerably large angular pieces, some perfect, others complex, irregular, or mutilated, and all approaching to a flat shape. The ancients were very fond of this species in public buildings; and the Temple of Fortune, built entirely of it, has long been celebrated. Its great beauty is its transparence, from which alone this temple was perfectly light when the doors were shut, though it was built without a window, and had no other light but what was transmitted through the stone its walls were built with. It was anciently found in Cappadocia, and is still plentiful there: we have it also in Germany and France, and in our own kingdom in Derbyshire, and some other counties. It takes an excellent polish, and is very fit for ornamental works, where there is no great strength required. See AMETHYST.

PHENICE, a port of the island of Crete, to the west of the island. St Paul having anchored at Phenice, when he was carried to Rome (Acts xxvii. 12.), advised the ship's crew to spend the winter there, because the season was too far advanced.

PHENICIA. See PHOENICIA.

PHEONS, in heraldry, the barbed heads of darts, arrows, or other weapons.

PHEOS, in botany, a name which Theophrastus, Dioscorides, and others, give to a plant used by fullers in dressing their cloths, and of which there were two kinds, a smaller called simply *pheos*, and a larger called *hippopheos*. This plant is sometimes called *phleos*; and is thus confounded with a kind of marsh cudweed, or *gnaphalium*, called also by that name; but it may always be discovered which of the two plants an author means, by observing the sense in which the word is used, and the use to which the plant was put. The *phleos*, properly so called, that is, the cudweed, was used to stuff beds and other such things, and to pack up with earthen vessels to prevent their breaking; but the *pheos*, improperly called *phleos*, only about cloths; this was, however, also called *stabe* and *cnaphon*.

PHERECRATES, a Greek comic poet, was contemporary with Plato and Aristophanes. After the example of the ancient comedians, who never introduced upon the theatre imaginary but living characters, he acted his contemporaries. But he did not abuse the liberty which at that time prevailed upon the stage;

and laid it down as a rule to himself never to destroy the reputation of any person. Twenty-one comedies are attributed to him, of which there now only remain some fragments collected by Hertelius and Grotius. From these fragments, however, it is easy to discern, that Pherecrates wrote the purest Greek, and possessed that ingenious and delicate raillery which is called *attic urbanity*. He was author of a kind of verse called, from his own name, *Pherecratick*. The three last feet were in hexameter verse, and the first of those three feet was always a spondee. This verse of Horace (for example, *Quamvis pontica pinus*) is a Pherecratick verse. We find in Plutarch a fragment of this poet upon the music of the Greeks, which has been critically examined by M. Burette of the academy of inscriptions. See the 15th volume of the collection published by that learned society.

PHERECYDES, a native of Scyros, flourished about the year 560 before the Christian era, and was disciple of Pittacus, one of the seven wise men of Greece (see PITTACUS). He is said to have been the first of all the philosophers who has written on natural subjects and the essence of the gods. He was also the first, it is said, who held the ridiculous opinion, "that animals are mere machines." He was Pythagoras's master, who loved him as his own father. This grateful scholar having heard that Pherecydes lay dangerously ill in the island of Delos, immediately repaired thither, in order to give every necessary assistance to the old man, and to take care that no means should be left untried for the recovery of his health. His great age, however, and the violence of his disease, having rendered every prescription ineffectual, his next care was to see him decently buried; and when he had paid the last duty to his remains, and erected a monument to his memory, he set out again for Italy. Other causes have been assigned for the death of Pherecydes: some say he was eaten up by lice, and others that he fell headlong from the top of Mount Corycius in his way to Delphos. He lived to the age of 85 years, and was one of the first prose writers among the Greeks.

"Marvellous circumstances have been related of him, which only deserve to be mentioned, in order to show that what has been deemed supernatural by ignorant spectators may be easily conceived to have happened from natural causes. A ship in full sail was at a distance approaching its harbour; Pherecydes predicted that it would never come into the haven, and it happened accordingly; for a storm arose which sunk the vessel. After drinking water from a well, he predicted an earthquake, which happened three days afterwards. It is easy to suppose that these predictions might have been the result of a careful observation of those phenomena which commonly precede storms or earthquakes in a climate where they frequently happen.

"It is difficult to give in any degree an accurate account of the doctrines of Pherecydes; both because he delivered them, after the manner of the times, under the concealment of symbols; and because very few memoirs of this philosopher remain. It is most probable that he taught those opinions concerning the gods and the origin of the world which the ancient Grecian theologists borrowed from Egypt;" and of which the reader will find accounts in different arti-

Phere-
cydes.

Enfield's
History of
Philosophy.

Phereclides of this work. See EGYPT, METAPHYSICS, MYSTERIES, MYTHOLOGY, and POLYTHEISM.

PHERETIMA, was the wife of Battus king of Cyrene, and the mother of Arcefilus. After her son's death, she recovered the kingdom by means of Amasis king of Egypt, and to avenge the murder of Arcefilus, she caused all his assassins to be crucified round the walls of Cyrene, and she cut off the breasts of their wives, and hung them up near the bodies of their husbands. It is said that she was devoured alive by worms; a punishment which, according to some of the ancients, was inflicted by Providence for her unparalleled cruelties.

PHERON, was a king of Egypt, who succeeded Sesotris. He was blind; and he recovered his sight by washing his eyes, according to the directions of the oracle, in the urine of a woman who had never had any unlawful connections. He tried his wife first, but she appeared to have been faithful to his bed, and she was burnt with all those whose urine could not restore sight to the king. He married the woman whose urine proved beneficial.

PHIAL, a well-known vessel made of glass, used for various purposes.

Leyden PHIAL, is a phial of glass coated on both sides with tin-foil for a considerable way up the sides, of great use in electrical experiments. See ELECTRICITY, *passim*.

PHIDIAS, the most famous sculptor of antiquity, was an Athenian, and a contemporary of the celebrated Pericles, who flourished in the 83d Olympiad. This wonderful artist was not only consummate in the use of his tools, but accomplished in those sciences and branches of knowledge which belong to his profession, as history, poetry, fable, geometry, optics, &c. He first taught the Greeks to imitate nature perfectly in this way; and all his works were received with admiration. They were also incredibly numerous; for it was almost peculiar to Phidias, that he united the greatest facility with the greatest perfection. His *Nemesis* was ranked among his first pieces: it was carved out of a block of marble, which was found in the camp of the Persians after they were defeated in the plains of Marathon. He made an excellent statue of Minerva for the Plateans; but the statue of this goddess in her magnificent temple at Athens, of which there are still some ruined remains, was an astonishing production of human art. Pericles, who had the care of this pompous edifice, gave orders to Phidias, whose prodigious talents he well knew, to make a statue of the goddess; and Phidias formed a figure of ivory and gold 39 feet high. Writers never speak of this illustrious monument of skill without raptures; yet what has rendered the name of the artist immortal, proved at that time his ruin. He had carved upon the shield of the goddess his own portrait and that of Pericles; and this was, by those that envied them, made a crime in Phidias. He was also charged with embezzling part of the materials which were designed for the statue. Upon this he withdrew to Elis, and revenged himself upon the ungrateful Athenians, by making for the Elians the Olympic Jupiter; a prodigy of art, and which was afterwards ranked among the seven wonders of the world. It was of ivory and gold; 60 feet high, and

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every way proportioned. "The majesty of the work did equal the majesty of the god (says Quintilian), and its beauty seems to have added lustre to the religion of the country." Phidias concluded his labours with this masterpiece; and the Elians, to do honour to his memory, erected, and appropriated to his descendants, an office, which consisted in keeping clean this magnificent image.

PHIDITIA, in Grecian antiquity, feasts celebrated with great frugality at Sparta. They were held in the public places and in the open air. Rich and poor assisted at them equally, and on the same footing; their design being to keep up peace, friendship, good understanding, and equality among the citizens great and small. It is said that those who attended this feast brought each a bushel of flour, eight measures of wine named *chorus*, five mince of cheese, and as many figs.

PHILA, in mythology, one of the attributes of Venus, which distinguishes her as the mother of love, from *erotia* to love.

PHILADELPHIA, in antiquity, were games instituted at Sardis to celebrate the union of Caracalla and Geta, the sons of Septimius Severus.

PHILADELPHIA, the capital of the state of Pennsylvania in North America, situated in W. Long. 75. 8. N. Lat. 39. 57. It is one of the most beautiful and regular cities in the world, being of an oblong form, situated on the west bank of the river Delaware, on an extensive plain, about 118 miles (some say more) from the sea. The length of the city east and west, that is, from the Delaware to the Schuylkill, upon the original plan of Mr Penn, is 10,300 feet, and the breadth, north and south, is 4837 feet. Not two fifths of the plot covered by the city charter is yet built. The inhabitants, however, have not confined themselves within the original limits of the city, but have built north and south along the Delaware two miles in length. The longest street is Second-street, about 700 feet from Delaware river, and parallel to it. The circumference of that part of the city which is built, if we include Kensington on the north and Southwark on the south, may be about five miles. Market-street is 100 feet wide, and runs the whole length of the city from river to river. Near the middle, it is intersected at right angles by Broad-street, 113 feet wide, running nearly north and south quite across the city.

Between Delaware river and Broad-street are 14 streets, nearly equidistant, running parallel with Broad-street across the city; and between Broad-street and the Schuylkill, there are nine streets equidistant from each other. Parallel to Market-street are eight other streets, running east and west from river to river, and intersect the cross streets at right angles; all these streets are 50 feet wide, except Arch-street, which is 65 feet wide. All the streets which run north and south, except Broad-street mentioned above, are 50 feet wide. There were four squares of eight acres each, one at each corner of the city, originally reserved for public and common uses. And in the centre of the city, where Broad-street and Market-street intersect each other, is a square of ten acres, reserved in like manner, to be planted with rows of trees for public walks. This city was founded in 1682 by the celebrated

Phidias
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Philadelph-
phia.

Philadel-
phia.

celebrated William Penn, who in October 1701 granted a charter incorporating the town with city privileges. In 1749 the dwelling houses were computed, and found to be 2076; in 1790, they amounted to 5000. They are in general handsomely built of brick; and contain 40,000 inhabitants, composed of almost all nations and religions. Their places for religious worship are as follow: The Friends or Quakers have five, the Presbyterians six, the Episcopalians three, the German Lutherans two, the German Calvinists one, the Catholics three, the Swedish Lutherans one, the Moravians one, the Baptists one, the Universal Baptists one, the Methodists one, the Jews one.

The other public buildings in the city, besides the university, academies, &c. are the following, viz. a state-house and offices, a city court-house, a county court-house, a carpenter's hall, a philosophical society's hall, a dispensary, an hospital and offices, an alms-house, a house of correction, a public factory of linen, cotton, and woollen, a public observatory, three brick market houses, a fish-market, a public gaol.

The university of Philadelphia was founded during the war. Its funds were partly given by the state, and partly taken from the old college of Philadelphia. A medical school, which was founded in 1765, is attached to the university; and has professors in all the branches of medicine, who prepare the students (whose number yearly is 50 or 60) for degrees in that science. Besides the university and medical school, there is the Protestant Episcopal academy, a very flourishing institution; the academy for young ladies; another for the Friends or Quakers, and one for the Germans; besides five free schools.

In Market-street, between Front and Fourth streets, is the principal market, built of brick, and is 1500 feet in length. This market, in respect to the quantity, the variety, and neatness of the provisions, is not equalled in America, and perhaps not exceeded in the world.

The Philadelphians are not so social, nor perhaps so hospitable, as the people in Boston, Charlestown, and New York. Various causes have contributed to this difference; among which the most operative has been the prevalence of party-spirit, which has been and is carried to greater lengths in this city than in any other in America; yet no city can boast of so many useful improvements in manufactures, in the mechanical arts, in the art of healing, and particularly in the science of humanity. In short, whether we consider the convenient local situation, the size, the beauty, the variety and utility of the improvements, in mechanics, in agriculture, and manufactures, or the industry, the enterprise, the humanity, and the abilities, of the inhabitants of the city of Philadelphia, it merits to be viewed as the capital not only of the province, but of the flourishing empire of United America.

Several canals are let into the town, which add much to the beauty and convenience of the place. Its quay is 200 feet square, to which ships of 400 or 500 tons may come up, and lay their broadsides close to it; with wet and dry docks for building and repairing ships, besides magazines, warehouses, and all other conveniences for exporting and importing merchandise. Scarce any thing can appear more beautiful than the city and the adjacent country, which for some

miles may be compared to a fine and flourishing garden.

Philadel-
phia.

Though all our readers must unquestionably have heard of the malignant fever which so lately raged in Philadelphia, yet as some of them may not be so well acquainted with particulars, it will not, we trust, be thought improper if we give a short account of that dreadful malady in this place. This account we shall extract from a pamphlet written by Matthew Carey, which had run through no less than three editions before the end of the last year.

Of this fever, then, it is observed, that, generally speaking, the mortality was not so great among women as among men, but that corpulent, high-fed, and drunken men, common prostitutes, and such of the poor as had been debilitated through the want of sufficient nourishment, and lived in dirty and confined habitations, became an easy prey to it; whilst those who resided in the suburbs, enjoying the benefit of country air, were little affected by it. A singular fact is, that the French residing in Philadelphia were in a remarkable degree exempt from it; a circumstance which cannot be accounted for. The report which prevailed here of the Africans having wholly escaped the disease, proves to be not altogether true, several of them having been seized. The fever, however, was found to yield more readily to medicine in them than in white persons.

We find the following account of the nature and symptoms of the disease, as described by Dr Currie, in the third edition of the pamphlet already mentioned. "The symptoms which characterised the first stage of the fever were, in the greatest number of cases, after a chilly fit of some duration, a quick tense pulse; hot skin; pain in the head, back, and limbs; flushed countenance; inflamed eye, moist tongue; oppression and sense of soreness at the stomach, especially upon pressure; frequent sick qualms, and retchings to vomit, without discharging any thing, except the contents last taken into the stomach; costiveness, &c. And when stools were procured, the first generally showed a defect of bile, or an obstruction to its entrance into the intestines. But brisk purges generally altered this appearance.

"These symptoms generally continued with more or less violence from one to three, four, or even five days; and then gradually abating, left the patient free from every complaint, except general debility. On the febrile symptoms suddenly subsiding, they were immediately succeeded by a yellow tinge in the opaque cornea, or whites of the eyes; an increased oppression at the præcordia, a constant puking of every thing taken into the stomach, with much straining, accompanied with a hoarse hollow noise.

"If these symptoms were not soon relieved, a vomiting of matter resembling coffee-grounds in colour and consistence, commonly called the *black vomit*, sometimes accompanied with or succeeded by hemorrhagies from the nose, fauces, gums, and other parts of the body; a yellowish purple colour, and putrescent appearance of the whole body, hiccup, agitations, deep and distressed sighing, comatose delirium, and finally death, are the consequence. When the disease proved fatal, it was generally between the fifth and eighth days.

"This was the most usual progress of this formidable

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phia.

midable disease through its several stages. There were, however, very considerable variations in the symptoms as well as in the duration of its different stages, according to the constitution and temperament of the patient, the state of the weather, the manner of treatment, &c.

"In some cases, signs of putrescency appeared at the beginning or before the end of the third day. In these, the black vomiting, which was generally a mortal symptom, and universal yellowness, appeared early. In these cases, also, a low delirium, and great prostration of strength, were constant symptoms, and coma came on very speedily.

"In some, the symptoms inclined more to the nervous than the inflammatory type. In these, the jaundice colour of the eye and skin, and the black vomiting, were more rare. But in the majority of cases, particularly after the nights became sensibly cooler, all the symptoms indicated violent irritation and inflammatory diathesis. In these cases, the skin was always dry, and the remissions very obscure.

"The febrile symptoms, however, as has been already observed, either gave way on the third, fourth, or fifth day, and then the patient recovered; or they were soon after succeeded by a different but much more dangerous train of symptoms, by debility, low pulse, cold skin (which assumed a tawny colour, mixed with purple), black vomiting, hemorrhages, hiccup, anxiety, restlessness, coma, &c. Many who survived the eighth day, though apparently out of danger, died suddenly in consequence of an hemorrhagy."

Purging the patient with calomel and jalap appears to have proved the most successful treatment; and the repeated use of the lancet in cases where no symptoms of putridity existed. Dr Griffiths, who had been seized with the disease, "was bled seven times in five days, and ascribes his recovery principally to that operation." Dr Maese also, "in five days, lost 72 ounces of blood, by which he was recovered when at the lowest stage of the disorder." It was generally remarked that an obstinate costiveness took place at the commencement of the disease; and when this was removed, by purgatives, within the first twelve hours, the patient seldom failed to do well.

The work concludes with a list of the committee for the relief of the sick, of which our author was a member: also the names of a large number of the inhabitants who were cut off, a series of meteorological tables, and a general account of burials during the prevalence of this fatal complaint. From the latter we extract the following account:

"August	-	-	325
"September	-	-	1442
"October	-	-	1993
"November	-	-	118
"Jews, returned in gross	-	-	3
"Baptists, do.	-	-	60
"Methodists, do.	-	-	32
"Free Quakers, do.	-	-	39
"German part of St Mary's congregation	-	-	30

Total 4042"

It is not difficult to conceive the general distress which such an evil must have occasioned to persons of every rank and description. Some of the most striking instances our author has related in very affecting terms;

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but no picture of human calamity perhaps ever exceeded the following: "A servant girl belonging to a family in this city, in which the fever had prevailed, was apprehensive of danger, and resolved to remove to a relation's house in the country. She was, however, taken sick on the road, and returned to town, where she could find no person to receive her. One of the guardians of the poor provided a cart, and took her to the alms-house, into which she was refused admittance. She was brought back, and the guardian offered five dollars to procure her a single night's lodging, but in vain. And in fine, after every effort made to provide her shelter, she absolutely expired in the cart."

We cannot dismiss the present article, though it has already extended to a sufficient length, without giving our readers an account of a very extraordinary people who live within 50 miles of Philadelphia; where there is a little town or colony, particularly remarkable on account of its origin and the manners of the people by whom it is inhabited. It was founded by a German, who, weary of the world, returned into the country that he might be more at liberty to give himself up to contemplation. Curiosity brought several of his countrymen to visit his retreat; and by degrees his pious, simple, and peaceable manners, induced them to settle near him; when they all formed a little colony, which they called *Euphrates*, in allusion to the Hebrews, who used to sing psalms on the borders of that river.

This little town forms a triangle, the outsidcs of which are bordered with mulberry and apple-trees planted with great regularity; and its inhabitants, we know not for what reason, are called *Dumplers*. In the middle of the town is a very large orchard, and between the orchard and those ranges of trees are houses built of wood, three stories high, where every Dumper is left to enjoy the pleasures of his meditation without disturbance. These contemplative men do not amount to above 500; and the extent of their territory is about 250 acres, bounded by a river, a piece of stagnated water, and a mountain covered with trees.

The men and women live in separate quarters of the town, and never see each other but at places of worship; for among the Dumplers there are no assemblies of any kind but for public business. Their lives are spent in labour, prayer, and sleep. Twice every day and night they are called forth from their cells to attend divine service. Like the Methodists and Quakers, every individual among them has the right of preaching when he thinks himself inspired. The favourite subjects on which they discourse in their assemblies, are humility, temperance, chastity, and the other Christian virtues. They never violate that day of repose which all orders of men, whether idle or luxurious, much delight in. They admit a hell and a paradise; but reject the eternity of future punishments. They abhor the doctrine of original sin as an impious blasphemy; and, in general, every tenet that is severe to men appears to them injurious to the Divinity. As they do not allow merit to any but voluntary works, they administer baptism only to the adult; at the same time, they think baptism so essentially necessary to salvation, that they imagine the souls of Christians

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Phians in another world are employed in converting those who have not died under the law of the Gospel. In this ridiculous opinion we have known Christians of other denominations, and who boasted a higher antiquity, that agreed with them.

Still more disinterested than the Quakers, they never enter into any law-suit. One may cheat, rob, and abuse them, without being exposed to any retaliation, or even to any complaint from them. On them religion has the same effect that philosophy had upon the Stoics: it makes them insensible to every kind of insult.

Nothing can be plainer than their dress. In winter it is a long white gown, from which there hangs a hood, which serves instead of a hat, a coarse shirt, thick shoes, and very wide breeches. The women are dressed very much like the men, except that they have no breeches. Their common food consists wholly of vegetables; not because it is unlawful to eat any other, but because that kind of abstinence is looked upon as more conformable to the spirit of Christianity, which has an aversion from blood.

Each individual follows with cheerfulness the branch of business allotted him; and the produce of all their labours is deposited in a common stock, for the use of the whole. This union of industry has not only established agriculture, manufactures, and all the arts necessary for the support of this little society, but hath also supplied, for the purposes of exchange, superfluities proportioned to the degree of its population.

Though the two sexes live separate at Euphrates, the Dumplers do not on that account foolishly renounce matrimony; but those who find themselves disposed to it, leave the town, and form an establishment in the country, which is supported at the public expence. They repay this by the produce of their labours, which is all thrown into the public treasury; and their children are sent to be educated in Euphrates, which they consider as their mother-country.—Without this wise privilege, the Dumplers would be no better than monks; and in process of time they would become either savages or libertines. They are at present an innocent, though perhaps deluded, race.

PHILADELPHIA, an ancient town of Turkey in Asia, in Natolia. It is seated at the foot of mount Tmolus, by the river Cogamus, from whence there is an exceeding fine view over an extensive plain. This place was founded by Attalus Philadelphus, brother of Eumenes.

It was very liable to earthquakes, which, perhaps, arose from its vicinity to the region called *Catakekanmene*. So severe were those earthquakes, that even the city walls were not secure; and so frequent were they, that these experienced daily concussions. The inhabitants, therefore, who were not numerous, lived in perpetual apprehension, and their constant employment was in repairs. In fact, so great were their fears, that their chief residence was in the country, the soil of which was very fertile. Such is Strabo's account of this place. In the year 1097, it was taken by assault by John Ducas the Greek general. It was without difficulty reduced also in the year 1106, under the same emperor. The Turks marched from the East with a design to plunder it and the maritime

towns. The Emperor Mamul, in 1175, retired for protection from the Turks to this place. In 1300 it fell by lot to Karaman. In 1306 it was besieged by Alifaras, and considerably harassed; but was not taken. In 1391, this place alone refused to admit Bajazet; but it was at length forced to capitulate for want of provisions. It has been matter of surprise that this town was not totally abandoned; and yet it has survived many cities less liable to inconveniences, and is still an extensive place, tho' in its appearance it is poor and mean. Some remnants of its walls are still standing, but with large gaps. The materials of the wall are small stones strongly cemented. It is thick, lofty, and has round towers. Near this place, between the mountains, there is a spring of a purgative quality; it is much esteemed, and many people resort to it in the hot months. It tastes like ink, is clear, but tinges the earth with the colour of ochre. The famous wall which credulity has asserted to be made of human bones, stands beyond this and beyond the town. See the next article.

When Dr Chandler was there, he tells us, "The *Travels in* bishop of Philadelphia was absent; but the proto-papas *Greece*. or chief-priest, his substitute, whom we went to visit, received us at his palace, a title given to a very indifferent house or rather a cottage of clay. We found him ignorant of the Greek tongue, and were forced to discourse with him by an interpreter in the Turkish language. He had no idea that Philadelphia existed before Christianity, but told us it had become a city in consequence of the many religious foundations. The number of churches he reckoned at 24, mostly in ruins, and mere masses of wall decorated with painted faints. Only six are in a better condition, and have their priests. The episcopal church is large, and ornamented with gilding, carving, and holy portraits. The Greeks are about 300 families, and live in a friendly intercourse with the Turks, of whom they speak well. We were assured that the clergy and laity in general knew as little of Greek as the proto-papas; and yet the liturgies and offices of the church are read as elsewhere, and have undergone no alteration on that account.

"The Philadelphians are a civil people. One of the Greeks sent us a small earthen vessel full of choice wine. Some families beneath the trees, by a rill of water, invited us to alight, and partake of their refreshments. They saluted us when we met; and the aga or governor, on hearing that we were Franks, bade us welcome by a messenger.

"Philadelphia possessing waters excellent in dying, and being situated on one of the most capital roads to Smyrna, is much frequented, especially by Armenian merchants. The Greeks still call this place by its ancient name, but the Turks call it *Allabijur*. The number of inhabitants are about 7000 or 8000; of whom 2000 are supposed to be Christians. It is about 40 miles E. S. E. of Smyrna. E. Long. 28. 15. N. Lat. 38. 28.

PHILADELPHIA-Stones, a name which some authors have given to what is otherwise called *Christian bones*, found in the walls of that city. It is a vulgar error that these walls are built of bones; and the tradition of the country is, that when the Turks took the place, they fortified it for themselves, and built their walls

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of the bones of the Christians whom they had killed there. Dr Smyth, in one of his epistles, mentions this wall as an instance of Turkish barbarity. This idle opinion has gained credit merely from a loose and porous stone of the sparry kind, found in an old aqueduct, which is still in the wall. Sir Paul Rycout brought home pieces of these stones, which even he supposed to have been bones, but they proved on examination to be various bodies, chiefly vegetable, incruusted over and preserved in a spar of the nature of that which forms incrustations in Knareborough spring, and other places with us. These bodies are often cemented together in considerable numbers by this matter, and their true shape lost in the congeries, till a diligent and judicious eye traces them regularly.

PHILADELPHIAN-Society, in ecclesiastical history, an obscure and inconsiderable society of mystics. They were formed about the end of the last century by an English female fanatic, whose name was *Jane Leadley*. This woman, seduced by her visions, predictions, and doctrines, several disciples, among whom were persons of learning. She believed that all dissensions among Christians would cease, and the kingdom of the Redeemer become a scene of charity and felicity, if Christians, disregarding the forms of doctrine or discipline of their several communions, would all join in committing their souls to the care of the internal guide, to be instructed, governed, and formed, by his divine impulse and suggestions. But she went farther than this: she even pretended a divine commission to proclaim the approach of this glorious communion of saints; and was convinced that the society established by herself was the true kingdom of Christ. One of her leading doctrines was, that of the final restoration of all intelligent beings to perfection and happiness.

PHILADELPHUS, in antiquity, was a title or surname borne by several ancient kings; formed from the Greek φίλος, "friend, lover," and ἀδελφός, "brother;" *q. d.* one who loves his brother or brethren. See PTOLEMY and EGYPT.

PHILADELPHUS, the PIPE-TREE, or *Mock-orange*; a genus of the monogynia order, belonging to the icolandria class of plants.

Species 1. The coronarius, white syringe, or mock-orange, has been long cultivated in the gardens of this country as a flowering shrub; it is not well known in what country it is to be found native. It rises seven or eight feet high; sending up a great number of slender stalks from the root. These have a grey bark, branch out from their sides, and are garnished with oval spear-shaped leaves. These last have deep indentures on their edges; their upper surface being of a deep green, but the under surface pale, with the taste of a fresh cucumber. The flowers are white, and come out from the sides and at the ends of the branches in loose bunches, each standing on a distinct foot-stalk: they have four oval petals, which spread open, with a great number of stamina within, surrounding the style.

This shrub by its flowers makes a fine figure in May and June; for they are produced in clusters both at the end and from the sides of the branches. They are of a fine white colour, and exceedingly fragrant. The petals of which each is composed are large, and spread open like those of the orange; and then form-

ing branches, which stand each on its own separate short footstalk, and being produced in plenty all over the shrub, both at once feast the eye and the smell: The eye, by the pleasing appearance it will then have; the smell, as the air at some distance will be replete with the odoriferous particles constantly emitted from those fragrant flowers. These flowers, however, are very improper for chimneys, water-glasses, &c. in rooms; for in those places their scent will be too strong; and for the ladies in particular, often too powerful.

The double-flowering syringa, is a low variety of this species, seldom rising to more than a yard high. The description of the other belongs to this sort, except that the leaves and branches are proportionally smaller and more numerous, and the bark of the shoots of a lighter brown. It is called the *Double-flowering syringa*, because it sometimes produces a flower or two with three or four rows of petals; whereas, in general, the flowers, which are very few, and seldom produced, are single. They are much smaller than those of the other; and you will not see a flower of any kind on this shrub oftener perhaps than once in five years. It is hardly worth propagating on this account; so that a few plants only ought to be admitted into a collection, to be ready for observation.

The dwarf syringa is still of lower growth than the other, seldom arising to more than two feet in height. The description of the first sort still agrees with this; only that the branches and leaves are still proportionally smaller and more numerous, and the bark is still of a lighter brown. It never produces flowers.

2. The nanus, with oval leaves somewhat indented, and double flowers, seldom rises above three feet high; the flowers come out singly from the sides of the branches, and have a double or treble row of petals of the same size and form as well as the same scent with the former; but this sort flowers very rarely, so is but little esteemed.

3. The inodorus, with entire leaves, is a native of Carolina, and as yet but little known in Europe. It rises with a shrubby stalk of about 16 feet in height, sending out slender branches from the sides opposite, garnished with smooth leaves sharpened like those of the pear-tree, and standing on pretty long foot-stalks. The flowers are produced at the ends of the branches; and are large, white, spreading open, with a great number of short stamina with yellow summits. This is called the *Carolina syringa*, is the tallest grower by far of any sort of the syringa, and makes the grandest show when in blow; though the flowers are destitute of smell.

The propagation of all the sorts is very easy: They are increased by layers, cuttings, or suckers. 1. The most certain method is by layers; for the young twigs being laid in the earth in the winter, will be good-rooted plants by the autumn following. 2. These plants may be increased by cuttings, which being planted in October, in a shady moist border, many of them will grow; though it will be proper to let those of the Carolina sort remain until spring, and then to plant them in pots, and help them by a little heat in the bed. By this assistance, hardly one cutting will fail. 3. They may be also increased by suckers; for all the sorts throw out suckers, though the Carolina syringa the least of any. These will all strike root, and

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and be fit for the nursery ground: nay, the double-flowering and the dwarf sorts are always increased this way; for these plants having stood five or six years, may be taken up and divided into several scores. All the plants, however, whether raised from layers, cuttings, or suckers, should be planted in the nursery-ground to get strength, before they are set out for good. They should be planted a foot asunder, and the distance in the rows should be two feet. After this, they will require no other care than hoeing the weeds, until they have stood about two years, which will be long enough for them to stand there.

PHILÆNI, were two brothers, citizens of Carthage, who sacrificed their lives for the good of their country. At the time when the Carthaginians ruled over the greatest part of Africa, the Cyrenians were also a great and wealthy people. The country in the middle betwixt them was all sandy, and of an uniform appearance. There was neither river nor mountain to distinguish their limits; a circumstance which engaged them in a terrible and tedious war with one another. After their armies and fleets had been often routed and put to flight on both sides, and they had weakened one another pretty much; and fearing lest, by and by, some third people should fall upon the conquered and conquerors together, equally weakened, upon a cessation of arms they made an agreement, "that upon a day appointed deputies should set out from their respective homes, and the place where they met one another should be accounted the common boundary of both nations." Accordingly, the two brothers called Philæni, sent from Carthage, made all dispatch to perform their journey. The Cyrenians proceeded more slowly. These last, perceiving themselves a little behind, and turning apprehensive of punishment at home for mismanaging the affair, charged the Carthaginians with setting out before the time; made a mighty bustle upon it; and, in short, would rather choose any thing than go away outdone. But whereas the Carthaginians desired any other terms, provided only they were fair, the Greeks made this proposal to the Carthaginians, "either to be buried alive in the place which they claimed as the boundary to their nation, or that they would advance forward to what place they inclined upon the same condition." The Philæni accepting the offer, made a sacrifice of themselves and their lives to their country, and so were buried alive. The Carthaginians dedicated altars in that place to the memory of the two brothers. These altars, called *Ara Philanorum*, served as a boundary to the empire of the Carthaginians, which extended from this monument to Hercules's Pillars, which is about 2000 miles, or, according to the accurate observations of the moderns, only 1420 geographical miles. It is Sallust who gives this account in his history of the Jugurthine war.

PHILANTHROPY is compounded of two Greek words which signify the love of mankind. It is therefore of nearly the same import with *benevolence* (A); and

differs from *friendship*, as this latter affection subsists only between a few individuals, whilst *philanthropy* comprehends the whole species.

Whether man has an instinctive propensity to love his species, which makes him incapable of happiness but in the midst of society, and impels him to do all the good that he can to others, feeling their felicity an addition to his own, is a question that has been warmly debated among philosophers ever since metaphysics was studied as a science. With the opinions of the ancients we shall not, in this detached article, trouble our readers; but it would be unpardonable to pass without notice the different theories which on so interesting a subject have divided the moderns.

Hobbes, who believed, or pretended to believe, that right results from power, and that in society there is no other standard of justice than the law of the land, or the will of the supreme magistrate, built his opinions upon a theory of human nature in which philanthropy has no place. According to him, mankind, in the original state of nature, were wholly *selfish*. Each endeavoured to seize, by fraud or force, whatever he thought would contribute to his comfort; and as all had nearly the same wants, the inevitable consequence of this selfishness was universal war. We are taught indeed by the same philosopher, that, in a series of ages, mankind discovered the misery of this state of nature; and therefore, upon the same basis of universal selfishness, formed societies, over which they placed supreme governors for the purpose of protecting the weak against the violence of the strong. He does not, however, explain how men, whose angry and selfish passions were thus excited to the utmost against each other, could enter upon this friendly treaty; or, supposing it formed, how the ignorant multitude were induced to pay obedience to the more enlightened few. Clogged with this and other insurmountable difficulties, his philosophy of human nature soon fell into merited contempt; but about the *origin* of philanthropy those who united in opposition to him still thought very differently from one another.

The elegant *Shaftesbury*, who had imbibed much of the spirit of Plato, endeavoured, like his master, to deduce all the duties of man, and almost all his actions, from a number of internal feelings or instincts which he supposed to be interwoven with his constitution by the immediate hand of God. This system appeared so honourable to human nature, and at the same time was so easily comprehended, that the noble lord had soon many followers, and may indeed be considered as the founder of a school which has produced philosophers whose works do honour to the age and country in which they flourished. Among these we must reckon *Bishop Butler*, *Hutchison*, *Lord Kames*, *Dr Beattie*, and perhaps *Dr Reid*.

According to the system of these writers, the whole duty of man results from an intuitive principle, to which they have given the name of the moral sense; and with this sense they conceive philanthropy to be inseparably

(A) We say *nearly* of the same import; because *benevolence* extends to every being that has life and sense, and is of course susceptible of pain and pleasure; whereas *philanthropy* cannot comprehend more than the human race.

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inseparably united, or rather perhaps to make an essential part of it. (See MORAL PHILOSOPHY.) If this theory be carried to its utmost extent, as it has been by some of its patrons, it seems to follow, that peace and harmony should reign among savages; and that a man who had from his infancy grown up in solitude, would be delighted with the first sight of a fellow-creature, and run to him with eagerness as to a new source of enjoyment. This conclusion, however, is contrary to acknowledged facts. Savages are generally divided into small tribes or hordes; and though the attachment of individuals to their own tribe appears indeed to be abundantly strong, the tribes themselves are frequently at war, and entertain a constant jealousy of each other. Savages, too, are almost universally afraid of strangers; and the few solitary individuals, who have been caught in parts where they had run wild from their infancy, instead of being delighted with the appearance of fellow-men, have either fled from them with their utmost speed, or been fixed to the spot in terror and astonishment. These are no indications of that instinctive philanthropy for which some writers so strenuously plead. They have indeed induced others to deny, that in human nature there is any instinctive principles at all; and to endeavour to account for our several propensities by the influence of education producing early and deep-rooted habits.

At the head of this school stood Locke and Hartley. The former, employing himself almost wholly on the intellectual powers of man, and combating the absurd, though then generally received, belief, that there are in the human mind innate principles of speculative truth, has touched but incidentally on our principles of action. It seems, however, to be evident, that he did not consider any *one* of these principles as innate; and his opinion was adopted by Hartley, who studied the sensitive part of human nature with greater industry and success than perhaps any writer who had preceded him in that department of science. This philosopher refuses all kinds of instinct to man, even the *alogyn* of a mother to her new-born infant, and that which has been generally supposed innate—the propensity of the infant to suck the breast. It is therefore needless to say that in his theory of human nature innate philanthropy can have no place.

The reader, however, must not suppose that the theory of Hartley is the theory of Hobbes. Though he admits no *innate* principles of action in the human mind, he is far from dreaming that the original state of man was a state of war and selfishness, or that the acquisition of philanthropic sentiments is not natural. He considers such acquisitions as even necessary and unavoidable, and founds them on the great law of association, which we have elsewhere endeavoured to explain (See METAPHYSICS, Part I. chap. v.) Hartley was a Christian, and appears to have been a man of great piety. Conceiving with Locke that men are born without any ideas, or any principles either of knowledge or of action, but that they are subject to the law of association as much as to the impressions of sense, he seems to have thought, that the important purpose for which they are sent into this world is, that they may acquire habits of piety and virtue, which, operating like instincts, will fit them for the purer society of a future state. That this theory is un-

friendly to morals, no man who understands it will presume to affirm. It appears, indeed, to be more consistent with the necessity of a revelation from God than that of Shaftesbury, which has so many followers: but notwithstanding this, we cannot help thinking that the excellent author has carried his antipathy to instincts by much too far (see INSTINCT), and that the truth lies in the middle between him and his opponents.

Without some instincts to influence before the dawn of reason, it is not easy to be conceived how children could be induced to that exercise which is absolutely necessary to life and health; nor does it appear with sufficient evidence that the human race are deserted by every instinct as soon as their rational powers are evolved. It seems to be a matter of fact which cannot be controverted, that women have an instinctive attachment to their new-born infants; but that these, when they become capable of distinguishing objects, are *instinctively* attached to their parents, their brothers, and sisters, is a position which, though it may be true, seems incapable of proof. That they soon appear to be so attached, is a fact which we believe no man will deny: but the attachment may be accounted for by the associating principle operating upon that desire of happiness which is necessarily formed as soon as happiness is experienced. (See PASSION.) An infant becomes earlier attached to its nurse than to any other person; because, feeling wants which she supplies, the idea of enjoyment becomes soon associated in its mind with the perception of the woman. If this woman be its mother, a hasty observer immediately attributes this attachment to instinct directing the infant to love its parent; but that instinct has here no place, is evident from the well-known facts, that a child is as fond of a tender nurse, though no relation, as of the most affectionate mother; and as regardless of a mother who seldom sees it, or sees it with indifference, as of any other person. Nay, we have seen children of the sweetest dispositions as fond of the maid with whom they slept, as of a very affectionate parent by whom they had been tenderly nursed: and sure no man will say that this could be instinct; it was evidently a new association of the idea of the maid with the greatest happiness which they enjoyed after the period of their suckling was at an end.

It is much in the same way that children acquire an attachment to their brothers and sisters. Brothers and sisters being constantly together, contribute to each other's amusement: hence arises that pleasure which they have in each other's company, and the uneasiness which they feel when separated. This generates mutual love in their minds, which is strengthened by the perpetual injunctions of their parents; for if these have any virtue themselves, they cannot fail to inculcate the duty of loving each other on their tender offspring. Benevolence, thus generated, soon extends to their daily companions; and takes a wider and a wider range as these companions are multiplied, and as children advance towards the state of manhood. New objects then present themselves to the mind. A man soon discovers, that, as he is a member of a community, his happiness as an individual depends in a great measure on the prosperity of the whole. Hence arises *patriotism*, and that pleasure which we all take

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in the eminence of our countrymen. But the principle of benevolence stops not here. He whose mind is enlarged by a liberal education, considers all particular countries as provinces of one great country extended over the whole globe; and all mankind, of course, as not only sharing the same nature with himself, but as being in reality his fellow-citizens and brethren. The principles of religion, if he be actuated by them, must aid these reflexions, and make him wish the happiness of all who stand in the same relation with himself to the Great Governor of the world. This is *philanthropy*; and we see how it may spring, by the great law of association, from desires which, in their original state, cannot be considered as other than selfish. It is a calm sentiment, which we believe hardly ever rises to the warmth of affection, and certainly not to the heat of passion.

Should any of our readers be disposed to controvert this opinion, or to fancy it degrading to human nature, we will not enter into controversy with them; we only beg leave to ask, whether they have ever rejoiced in the good fortune of a stranger or a foreigner, or regretted his loss, with any portion of those feelings which they have frequently experienced on hearing of the prosperity or the death of a friend or a neighbour? We answer candidly for ourselves, that we feel no interest which can be called *passion* or *affection* in the fortunes of a native of China; and yet we should be sorry to think that our philanthropy is less than that of other men. A common clown, we are inclined to believe, seldom extends his affection beyond his friends and neighbours; and though, from having often heard his country praised, and knowing that he belongs to that country, he would probably be offended at the man who should prefer another to it; yet if no misfortune befall himself, or his friends and neighbours, we imagine that his grief for public calamities may be borne with patience. In his mind no such associations have been formed as comprise the good of a country, far less of all countries; and therefore his philanthropy must be confined to a very limited range. We doubt not, however, but that as opportunity offers, and as circumstances permit, such a man is ready to feed the hungry and clothe the naked of all countries; not indeed from sentiments of affection either innate or acquired, but from the obvious reflection that he is not exempted from those calamities which have befallen them, and from a still higher principle—a sense of duty to that God who has made of one blood all nations upon earth, and commanded them to be mutually aiding to each other.

PHILEMON, a Greek comic poet, was son to Damon, and cotemporary with Menander. Any advantage he had over this poet, was owing less to his own merit than to the intrigues of his friends. Plautus has imitated his comedy *du' Marchand*. He is reported to have died laughing on seeing his ass eat figs. He was then about 97 years of age. His son, Philemon the younger, was also the author of 54 comedies, of which there are still extant some considerable fragments collected by Grotius. These clearly prove that he was not a poet of the first rank. He flourished about the year 274 before our Saviour.

PHILEMON, was a rich citizen of Colossæ in Phrygia.

He was converted to the Christian faith, with Appia his wife, by Epaphras the disciple of St Paul; for St Paul himself did not preach at Colossæ, Coloss. ii. 1. Perhaps we should have known nothing of St Philemon, had it not been on the account of his slave Onesimus, who having robbed him, and run away from him, came to Rome, where he found St Paul, and was very serviceable to him. St Paul converted him, baptized him, and sent him back to his master Philemon; to whom he wrote a letter still extant, and which passes for a masterpiece of that kind of eloquence, natural, lively, strong, and pathetic, that was peculiar to St Paul. Philemon (1. 2.) had made a church of his house, and all his domestics, as well as himself, were of the household of faith. His charity, liberality, and compassion, were a sure refuge to all that were in distress. The Apostolical Constitutions say, that St Paul made him bishop of Colossæ; but the Menæa insinuate, that he went to Gaza in Palestine, of which he was the apostle and first bishop. From thence he returned to Colossæ, where he suffered martyrdom with Appia his wife, in the time of Nero. They relate several particulars of his martyrdom, and say, that his body remained at Colossæ, where it performed several miracles.

PHILETAS, a Greek poet and grammarian, of the island of Cos, flourished under Philip and Alexander the Great, and was preceptor of Ptolemy Philadelphus. He was the author of some Elegies, Epigrams, and other works, which have not come down to us. He is celebrated in the poems of Ovid and Propertius, as one of the best poets of his age. Elian reports a very improbable story of him, namely, 'that his body was so slender and feeble, that he was obliged to have some lead in his pockets, to prevent him from being carried away by the wind.'

PHILETUS. St Paul, writing to Timothy (2 Tim. ii. 16, 17, 18.) in the 65th year of Christ, and a little while before his own martyrdom, speaks thus: "But shun profane and vain babblings, for they will increase unto more ungodliness. And their word will eat as doth a canker; of whom is Hymenæus and Philetus; who concerning the truth have erred, saying, that the resurrection is past already, and overthrow the faith of some." We have nothing very certain concerning Philetus; for we make but small account of what is read in the false Abdias, in the life of St James major, even supposing this author had not put the name of Philetus instead of Phygellus. This is the substance of what is found in Abdias. St James the son of Zebedee, passing through the synagogues of Judea and Samaria, preached everywhere the faith of Jesus Christ. Hermogenes and Philetus strenuously opposed him, affirming, that Jesus Christ was not the Messiah. Hermogenes was a notable magician, and Philetus was his disciple, who being converted, was desirous to bring his master to St James; but Hermogenes bound him up so by his magic art, that he could not come at the apostle. Philetus found means to make St James acquainted with what had happened to him; upon which St James unbound him, and Philetus came to him. Hermogenes perceiving how ineffectual his art was against the saint, became himself a convert as well as Philetus.

PHILIBEG, is a little plaid, called also *kilt*, and

Philetas
||
Philibeg.

Philip. is a sort of short petticoat reaching nearly to the knees, worn by the Scotch Highlanders. It is a modern substitute for the lower part of the plaid, being found to be less cumbersome, especially in time of action, when the Highlanders used to tuck their breechclan into their girdle. Almost all of them have a great pouch of badger and other skins, with tassels dangling before, in which they keep their tobacco and money.

PHILIP, foster-brother of Antiochus Epiphanes (1 Macc. vi. 14, & 55. 2 Macc. ix. 29.), was a Phrygian by birth, and very much in Antiochus's favour. This prince made him governor of Jerusalem (2 Macc. viii. 8. v. 22.) where he committed many outrages upon the Jews, to force them to forsake their religion. Seeing that Apollonius and Seron were defeated by Judas Maccabæus, he sent for new succours to Ptolemy governor of Cælo-Syria, who sent him Gorgias and Nicator with a powerful army. Some time after, Antiochus going beyond the Euphrates, to extort money from the people, Philip went along with him; and Antiochus finding himself near his end (1 Macc. vi. 14.) made him regent of the kingdom, put his diadem into his hands, his royal cloak, and his ring, that he might render them to his son the young Antiochus Eupator. But Lysias having taken possession of the government in the name of young Eupator, who was but a child, Philip not being able to cope with him, durst not return into Syria; but he went into Egypt, carrying the body of Epiphanes along with him, there to implore assistance from Ptolemy Philometor against Lysias the usurper of the government of Syria. The year following, while Lysias was busy in the war carrying on against the Jews, Philip got into Syria, and took possession of Antioch: but Lysias returning into the country, with great diligence, retook Antioch, and put Philip to death, who was taken in the city.

PHILIP the apostle was a native of Bethsaida in Galilee. Jesus Christ having seen him, said to him, "Follow me," John i. 43, 44, &c. Philip followed him; and soon after finding Nathanael, Philip said to him, "We have found the Messiah, of whom Moses and the prophets have spoken, Jesus of Nazareth, the son of Joseph." Nathanael asked him, "Can any thing good come out of Nazareth? To which Philip replied, "Come and see." Then he brought Nathanael to Jesus, and they went with him to the marriage of Cana in Galilee. St Philip was called at the very beginning of our Saviour's mission; and when Jesus Christ was about to feed the 5000 that followed him (Luke vi. 13. Mat. x. 2. John vi. 5—7.), he asked St Philip, only to prove him, whence bread might be bought for such a multitude of people? Philip answered, that 200 penny-worth of bread would not be sufficient for every one to taste a little. Some Gentiles, having a curiosity to see Jesus Christ, a little before his passion, they addressed themselves to St Philip (John xii. 21, 22.), who mentioned it to St Andrew, and these two to Christ. At the last supper, Philip desired our Saviour, that he would be pleased to show them the Father, being all that they desired (John xiv. 8—10.) But Jesus told them, that seeing the Son they saw the Father also. This is all we find concerning Philip in the gospel.

The upper Asia fell to this apostle's lot, where he

took great pains in planting the gospel, and by his preaching and miracles made many converts. In the latter part of his life, he came to Hierapolis in Phrygia, a city very much addicted to idolatry, and particularly to the worship of a serpent of a prodigious bigness. St Philip by his prayers procured the death, or at least the disappearing, of this monster, and convinced its worshippers of the absurdity of paying divine honours to such odious creatures. But the magistrates, enraged at Philip's success, imprisoned him, and ordered him to be severely scourged, and then put to death, which some say was by crucifixion; others, by hanging him up against a pillar. St Philip is generally reckoned among the married apostles; and it is said he had three daughters, two whereof preserved their virginity, and died at Hierapolis; the third, having led a very spiritual life, died at Ephesus. He left behind him no writings. The gospel under his name was forged by the Gnostics, to countenance their bad principles and worse practices. The Christian church observes the festival of this saint, together with that of St James, on the first day of May. Euseb. lib. iii. c. 30.

PHILIP, the second of the seven deacons, was chosen by the apostles after our Saviour's resurrection. (Acts vi. 5.) This deacon, they say, was of Cæsarea in Palestine. It is certain that his daughters lived in this city (Acts xxi. 8, 9.) After the death of St Stephen, all the Christians, excepting the apostles, having left Jerusalem, and being dispersed in several places, St Philip went to preach at Samaria (*id.* viii. 1, 2, &c.), where he performed several miracles, and converted many persons. He baptised them; but being only a deacon, he could not confer on them the Holy Ghost. Wherefore having made known to the apostles at Jerusalem, that Samaria had received the word of God, Peter and John came thither, and the Samaritans that were converted received the Holy Ghost. St Philip was probably at Samaria when the angel of the Lord ordered him to go to the south part of the country, in the road that leads from Jerusalem to old Gaza. Philip obeyed, and there met with an Ethiopian eunuch belonging to Queen Candace, who had the care of her revenues, and had been at Jerusalem to worship God there (*id.* viii. 26, 27, &c.) He was then returning into his own country, and was reading the prophet Isaiah as he went along in his chariot. Philip, hearing the eunuch reading the prophet Isaiah, said to him, Do you understand what you read? The eunuch replied, How should I understand, except somebody explain it to me? He desired Philip therefore to come and sit down by him in the chariot. The passage the eunuch was reading is this, "He was led as a sheep to the slaughter, and like a lamb dumb before his shearer, so he opened not his mouth." The eunuch then says to Philip, Pray, whom does the prophet speak of in this place? Is it of himself, or of some other? Then Philip began to instruct him concerning Jesus Christ. And having gone on together, they came to a fountain; when the eunuch said to Philip, Here is water, what hinders me from being baptized? Philip told him that he might be so, if he believed with all his heart. He replied, I believe that Jesus Christ is the son of God. He then ordered the chariot to stop, and they both alighted and went down into the water,

Philip.

Philip.

ter, where Philip baptized the eunuch. Being come out of the water, the Spirit of the Lord took away Philip, and the eunuch saw no more of him. But Philip was found again at Azotus, and he preached the gospel in all the cities he passed through, till he arrived at Cæsarea in Palestine. After this, the scripture does not inform us of any particulars relating to Philip. The modern Greeks say that he went to Tralles in Asia, where he founded a church, of which he was the apostle and bishop; and where he rested in peace, after performing many miracles. The Latins, on the contrary, say that he died at Cæsarea, and that three of his daughters were there buried with him.

It is thought, that the eunuch converted by St Philip was the first apostle of the Ethiopians; and that the Abyssines boast of having received the Christian faith from him.

*Tempriere's
Bibliotheca
Classica.*

PHILIP II. was the 4th son of Amyntas, king of Macedonia. He was sent to Thebes as an hostage by his father, where he learnt the art of war under Epaminondas, and studied with the greatest care the manners and the pursuits of the Greeks. He discovered, from his earliest years, that quickness of genius and greatness of courage which afterwards procured him so great a name and such powerful enemies. He was recalled to Macedonia; and at the death of his brother Perdiccas he ascended the throne as guardian and protector of the youthful years of his nephew. His ambition, however, soon discovered itself, and he made himself independent about the year 360 before Christ. The valour of a prudent general, and the policy of an experienced statesman, seemed requisite to ensure his power. The neighbouring nations, ridiculing the youth and inexperience of the new king of Macedonia, appeared in arms; but Philip soon convinced them of their error. Unable to meet them as yet in the field of battle, he suspended their fury by presents, and soon turned his arms against Amphipolis, a colony tributary to the Athenians. Amphipolis was conquered, and added to the kingdom of Macedonia; and Philip meditated no less than the destruction of a republic which had rendered itself so formidable to the rest of Greece, and had even claimed submission from the princes of Macedonia. His designs, however, were as yet immature; and before he could make Athens an object of conquest, the Thracians and the Illyrians demanded his attention. He made himself master of a Thracian colony, to which he gave the name of *Philippi*, and from which he received the greatest advantages on account of the golden mines in the neighbourhood. These made it a very important capture. He settled in it a number of workmen, and was the first who caused gold to be coined in his own name. He employed his wealth in procuring spies and partisans in all the great cities of Greece, and in making conquests without the aid of arms. It was at the siege of Methone in Thrace that Philip had the misfortune to receive a wound in his right eye from the stroke of an arrow. In the midst of his political prosperity, Philip did not neglect the honour of his family. He married Olympias the daughter of Neoptolemus, king of the Molossi; and when, some time after, he became father of Alexander, the monarch, conscious of the inestimable advantages which arise from the lessons, the example, and conversation

of a learned and virtuous preceptor, wrote a letter with his own hand to the philosopher Aristotle, and begged him to retire from his usual pursuits, and to dedicate his whole time to the instruction of the young prince. Every thing seemed now to conspire to his aggrandizement; and historians have observed that Philip received in one day the intelligence of three things which could gratify the most unbounded ambition, and flatter the hopes of the most aspiring monarch: the birth of a son, an honourable crown at the Olympic games, and a victory over the barbarians of Illyricum. But all these increased rather than satiated his ambition: he declared his inimical sentiments against the power of Athens, and the independence of all Greece, by laying siege to Olynthus, a place which, on account of its situation and consequence, would prove most injurious to the interests of the Athenians, and most advantageous to the intrigues and military operations of every Macedonian prince. The Athenians, roused by the eloquence of Demosthenes, sent 17 vessels and 2000 men to the assistance of Olynthus; but the money of Philip prevailed over all their efforts. The greatest part of the citizens suffered themselves to be bribed by the Macedonian gold, and Olynthus surrendered to the enemy, and was instantly reduced to ruins. Philip soon after defeated the Athenians, and made a great number of them prisoners, whom he dismissed without ransom. Of this victory, the fruit of that excellent discipline which he had established in his army, the Macedonian phalanx had the principal honour. This was a body of infantry heavily armed, consisting commonly of 16,000 men, who had each of them a shield six feet high and a pike 21 feet long. (See PHALANX). The success of his arms, and especially his generosity after victory, made his alliance and a peace a desirable object to the people of Athens; and as both parties were inclined to this measure, it was concluded without delay. His successes were as great in every part of Greece: he was declared head of the Amphictyonic council, and was entrusted with the care of the sacred temple of Apollo at Delphi. If he was recalled to Macedonia, it was only to add fresh laurels to his crown, by victories over his enemies in Illyricum and Thessaly. By assuming the mask of a moderator and peace-maker, he gained confidence; and in attempting to protect the Peloponnesians against the incroaching power of Sparta, he rendered his cause popular; and by ridiculing the insults that were offered to his person as he passed through Corinth, he displayed to the world his moderation and philosophic virtues. In his attempts to make himself master of Eubœa, Philip was unsuccessful; and Phocion, who despised his gold as well as his meanness, obliged him to evacuate an island whose inhabitants were as insensible to the charms of money as they were unmoved at the horrors of war, and the bold efforts of a vigilant enemy. From Eubœa he turned his arms against the Scythians; but the advantages he obtained over this indigent nation were inconsiderable, and he again made Greece an object of plunder and rapine. He advanced far in Boeotia, and a general engagement was fought at Chæronea. The fight was long and bloody, but Philip obtained the victory. His behaviour after the battle reflects great disgrace upon him as a man and as a monarch. In the hour of festi-

Philip.

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Philip.

ty, and during the entertainment which he had given to celebrate the trophies he had won, Philip sallied from his camp, and with the inhumanity of a brute, he insulted the bodies of the slain, and exulted over the calamities of the prisoners of war. His insolence, however, was checked, when Demades, one of the Athenian captives, reminded him of his meanness, by exclaiming, "Why do you, O king, act the part of a Therites, when you can represent with so much dignity the elevated character of an Agamemnon?" The reproof was felt; Demades received his liberty; and Philip learned how to gain popularity even among his fallen enemies, by relieving their wants and easing their distresses. At the battle of Chæronea the independence of Greece was extinguished; and Philip, unable to find new enemies in Europe, formed new enterprises, and meditated new conquests. He was nominated general of the Greeks against the Persians, and was called upon as well from inclination as duty to revenge those injuries which Greece had suffered from the invasions of Darius and of Xerxes. But he was stopped in the midst of his warlike preparations, being stabbed by Pausanias as he entered the theatre at the celebration of the nuptials of his daughter Cleopatra. This murder has given rise to many reflections upon the causes which produced it; and many who consider the recent repudiation of Olympias and the resentment of Alexander, are apt to investigate the causes of his death in the bosom of his family. The ridiculous honours which Olympias paid to her husband's murderer strengthened the suspicion; yet Alexander declared that he invaded the kingdom of Persia to revenge his father's death upon the Persian satraps and princes, by whose immediate intrigues the assassination had been committed. The character of Philip is that of a sagacious, artful, prudent, and intriguing monarch: he was brave in the field of battle, eloquent and dissimulating at home, and he possessed the wonderful art of changing his conduct according to the disposition and caprice of mankind, without ever altering his purpose, or losing sight of his ambitious aims. He possessed much perseverance, and in the execution of his plans he was always vigorous. He had that eloquence which is inspired by strong passions. The hand of an assassin prevented him from achieving the boldest and the most extensive of his undertakings; and he might have acquired as many laurels, and conquered as many nations, as his son Alexander did in the succeeding reign; and the kingdom of Persia might have been added to the Macedonian empire, perhaps with greater moderation, with more glory, and with more lasting advantages. The private character of Philip lies open to censure, and raises indignation. The admirer of his virtues is disgusted to find him among the most abandoned prostitutes, and disgracing himself by the most unnatural crimes and lascivious indulgencies which can make even the most debauched and the most profligate to blush. He was murdered in the 47th year of his age, and the 24th of his reign, about 336 years before the Christian era. His reign is become uncommonly interesting, and his administration a matter of instruction. He is the first monarch whose life and actions are described with peculiar accuracy and historical faithfulness. Philip was the father of Alexander the Great and of Cleopatra, by Olympias; he had also by Audaca an Illyrian, Cyna, who married

Amyntas the son of Perdiccas, Philip's elder brother; by Nicasipolis a Theffalian, Nicæa, who married Cassander; by Philæna a Larissæan dancer, Aridæus, who reigned some time after Alexander's death; by Cleopatra, the niece of Attalus, Caranus and Europa, who were both murdered by Olympias; and Ptolemy, the first king of Egypt, by Arsinoë, who in the first month of her pregnancy was married to Lagus. Of the many memorable actions and sayings reported by Plutarch of this prince, the following are the most remarkable. Being present at the sale of some captives, in an indecent posture, one of them informed him of it; "Set this man at liberty (says Philip), I did not know that he was my friend." Being solicited to favour a lord of his court, who was like to lose his character by a just but severe sentence, Philip refused to hearken to the solicitation, and added, "I had rather that he be disgraced than myself." A poor woman was importuning him to do her justice; and as he sent her away from day to day, under the pretence that he had no time to attend to her petition, she said to him with some warmth, "Cease then to be a king." Philip felt all the force of this reproof, and immediately gave her satisfaction.—Another woman came to ask justice of him as he was going out from a great entertainment, and was condemned. "I appeal (exclaimed she)!" "And to whom do you appeal (said the king to her)?" "To Philip fasting." This answer opened the eyes of the monarch, who retracted his sentence. If he possessed any virtue, it was principally that of suffering injuries with patience. Democharus, to whom the Greeks gave the surname of *Parrhesiastes*, on account of his excessive petulance of tongue, was one of the deputies whom the Athenians sent to this monarch. Philip, at the conclusion of the audience, begged the ambassadors to tell him, "if he could be of any service to the Athenians;" to which Democharus gave an insolent return, which he forgave. Having learned that some Athenian ambassadors charged him, in full assembly, with atrocious calumnies: "I am under great obligations (said he) to those gentlemen, for I shall henceforwards be so circumspect in my words and actions, that I shall convict them of falsehood." One saying of Philip, which does him less honour than those we have before-mentioned, was, "Let us amuse children with playthings, and men with oaths." This abominable maxim, which was the soul and spring of his politics, gave rise to the observation, "That he was in full length, what Louis XI. afterwards was in miniature." It is well known that Philip had a person about him, who called out at times, "Philip, remember that thou art mortal;" but whether we should place this to the account of his pride or his humility, it is difficult to say.

PHILIP V. was king of Macedonia, and son of Demetrius. His infancy, at the death of his father, was protected by Antigonus, one of his friends, who ascended the throne, and reigned for 12 years, with the title of *Independent monarch*. When Antigonus died, Philip recovered his father's throne, though only 15 years of age, and he early distinguished himself by his boldness and his ambitious views. He came to the throne in the year 220 before our Saviour, and the beginning of his reign was rendered glorious by the conquests of Aratus; a general who was as eminent for his love of justice as his skill in war. But so virtuous

Philip.

Ibid.

Philip.

a character could hardly fail to be disagreeable to a prince who wanted to indulge himself in every species of dissipation and vice: and indeed his cruelty to him soon displayed his character in its true light; for to the gratification of every vice, and every extravagant propensity, he had the meanness to sacrifice this faithful and virtuous Athenian. Not satisfied with the kingdom of Macedonia, Philip aspired to become the friend of Annibal, and wished to share with him the spoils which the distresses and continual loss of the Romans seemed soon to promise. But his expectations were frustrated; the Romans discovered his intrigues; and though weakened by the valour and artifice of the Carthaginian, yet they were soon enabled to meet him in the field of battle. The consul Lævinus entered without delay his territories of Macedonia; and after he had obtained a victory over him near Apollonia, and reduced his fleet to ashes, he compelled him to sue for peace. This peaceful disposition was not permanent; and when the Romans discovered that he had assisted their formidable enemy Annibal with men and money, they appointed T. Q. Flaminius to punish his perfidy, and the violation of the treaty. The Roman consul, with his usual expedition, invaded Macedonia; and in a general engagement, which was fought near Cynocephale, the hostile army was totally defeated, and the monarch saved his life with difficulty by flying from the field of battle. Destitute of resources, without friends either at home or abroad, Philip was obliged to submit to the mercy of the conqueror, and to demand peace by his ambassadors. It was granted with difficulty; the terms were humiliating; but the poverty of Philip obliged him to accept the conditions, however disadvantageous and degrading to his dignity. In the midst of these public calamities, the peace of his family was disturbed; and Perseus, the eldest of his sons by a concubine, raised seditions against his brother Demetrius, whose condescension and humanity had gained popularity among the Macedonians, and who from his residence at Rome, as an hostage, had gained the good graces of the senate, and by the modesty and innocence of his manners had obtained forgiveness from that venerable body for the hostilities of his father. Philip listened with too much avidity to the false accusations of Perseus; and when he heard it asserted that Demetrius wished to rob him of his crown, he no longer hesitated to punish with death so unworthy and so ungrateful a son. No sooner was Demetrius sacrificed to credulity, than Philip became convinced of his cruelty and rashness; and to punish the perfidy of Perseus, he attempted to make Antigonus, another son, his successor on the Macedonian throne. But he was prevented from executing his purpose by death, in the 42d year of his reign, 178 years before the Christian era. The assassin of Demetrius succeeded his father, and with the same ambition, with the same rashness and oppression, renewed the war against the Romans, till his empire was destroyed, and Macedonia became a Roman province. Philip has been compared with his great ancestor of the same name; but though they possessed the same virtues, the same ambition, and were tainted with the same vices, yet the father of Alexander was more sagacious and more intriguing, and the son of Demetrius was more suspicious, more cruel, and more implacable; and, according to the

pretended prophecy of one of the Sybils, Macedonia was indebted to one Philip for her rise and consequence among nations, and under another Philip she lamented the loss of her power, her empire, and her dignity.

PHILIP (M. Julius), a Roman emperor, of an obscure family in Arabia, from whence he was surnamed *Arabian*. From the lowest rank in the army he gradually rose to the highest offices; and when he was made general of the pretorian guards, he assassinated Gordian, to make himself emperor. To secure himself on the imperial throne, he left Mesopotamia a prey to the continual invasions of the Persians, and hurried to Rome, where his election was universally approved by the senate and the Roman people. Philip rendered his cause popular by his liberality and profusion; and it added much to his splendor and dignity, that the Romans during his reign commemorated the foundation of their city; a solemnity which was observed but once every 100 years, and which was celebrated with more pomp and more magnificence than under the preceding reigns. The people were entertained with games and spectacles; the theatre of Pompey was successively crowded during three days and three nights; and 2000 gladiators bled in the circus at once, for the amusement and pleasure of a gazing populace. His usurpation, however, was short. Philip was defeated by Decius, who had proclaimed himself emperor in Pannonia; and he was assassinated by his own soldiers near Verona, in the 45th year of his age, and the 5th of his reign. His son, who bore the same name, and who had shared with him the imperial dignity, was also massacred in the arms of his mother. Young Philip was then in the 12th year of his age, and the Romans lamented in him the loss of rising talents, of natural humanity, and endearing virtues.

PHILIP, a native of Acarnania, physician to Alexander the Great. When that monarch had been suddenly taken ill, after bathing in the Cydnus, Philip undertook to remove the complaint, when the rest of the physicians believed that all medical assistance would be ineffectual. But as he was preparing his medicine, Alexander received a letter from Parmenio, in which he was advised to beware of his physician Philip, as he had conspired against his life. The monarch was alarmed; and when Philip presented him the medicine, he gave him Parmenio's letter to peruse, and began to drink the potion. The serenity and composure of Philip's countenance, as he read the letter, removed every suspicion from Alexander's breast, and he pursued the directions of his physician, and in a few days recovered.

There were, besides, a vast number of persons of this name in antiquity, and many of them were very eminent.

PHILIP I. king of France, succeeded his father Henry I. in 1060, when but eight years of age, under the regency and guardianship of Baudouin V. count of Flanders, who discharged his trust with zeal and fidelity. He defeated the Gascons who were inclined to revolt, and died, leaving his pupil 15 years of age. This young prince made war in Flanders against Robert, Baudouin's younger son, who had invaded Flanders, which belonged to the children of his el-

Philip.

Ibid.

Ibid.

det

Philip. der brother. Philip marched against him with a numerous army, which was cut to pieces near Mount Cassel. Peace was the consequence of the victory, and the conqueror quietly enjoyed his usurpation. Philip, after the fatigues of the war, by way of relaxation gave himself up entirely to pleasure and dissipation. Tired of his wife Bertha, and fond of Bertrade, spouse of Foulques count of Anjou, he carried her off from her husband. Having, in 1093, legally annulled his own marriage, under the pretext of barrenness, and Bertrade's marriage with the count of Anjou having been set aside under the same pretext, Philip and she were afterwards solemnly married by the bishop of Beauvais. This union was declared void by Pope Urban II. a Frenchman by birth, who pronounced the sentence in the king's own dominions, to which he had come for an asylum. Philip, fearing that the anathemas of the Roman pontiff might be the means of exciting his subjects to rebellion, sent deputies to the pope, who obtained a delay, during which time he was permitted to use the crown. To know what is meant by this permission, it is necessary to recollect, that at that period kings appeared on public solemnities in royal habit, with the crown on their heads, which they received from the hand of a bishop. This delay was not of long duration. Philip was excommunicated anew in a council held at Poitiers in 1100; but in the year 1104, Lambert bishop of Arras, legate of Pope Paschal II. at last brought him his absolution to Paris, after having made him promise never to see Bertrade more; a promise which he did not keep. It would appear that the pope afterwards approved their marriage; for Suger informs us, that their sons were declared capable of succeeding to the crown. Philip died at Melun the 29th of July 1108, aged 57 years, after having witnessed the first crusade, in which he declined taking any part. His reign, which comprehends a period of 48 years, was the longest of any of his predecessors, excepting that of Clotarius, and of all who came after him except those of Louis XIV. and Louis XV. It was distinguished by several great events: but Philip, though brave in battle, and wise in counsels, was no very excellent character. He appeared so much the more contemptible to his subjects, as that age abounded with heroes. Philip is not the first of the French monarchs (as is commonly reported), who, in order to give the greater authority to his charters, caused them to be subscribed by the officers of the crown; for Henry I. had sometimes done the same before him.

PHILIP II. surnamed *Augustus*, the conqueror and given of God, son of Louis VII. (called the younger). King of France, and of Alix, his third wife, daughter of Thibault, count of Champagne, was born the 22d of August 1165. He came to the crown, after his father's death in 1180, at the age of 15 years. His youth was not spent like that of the generality of other princes; for, by avoiding the rock of pleasure on which so many are apt to split, his courage thereby became the more lively and intrepid. The king of England seemed willing to take advantage of his minority, and to seize upon a part of his dominions. But Philip marched against him, and compelled him, sword in hand, to confirm the ancient treaties between the two kingdoms. As soon as the

war was ended, he made his people enjoy the blessings of peace. He gave a check to the oppressions of the great lords, banished the comedians, punished blasphemies, caused the streets and public places of Paris to be paved, and annexed to that capital a part of the adjacent villages. It was inclosed by walls with towers; and the inhabitants of other cities were equally proud to fortify and embellish theirs. The Jews having for a long time practised the most shameful frauds in France, Philip expelled them from his kingdom, and declared his subjects quit with them; an action unjust, contrary to the laws of nature, and consequently to religion. The tranquillity of France was somewhat disturbed by a difference with the count of Flanders, which was however happily terminated in 1184. Some time after he declared war against Henry II. king of England, and took from him the towns of Iffoudun, Tours, Mans and other places. The epidemical madness of the crusades then agitated all Europe; and Philip, as well as other princes, caught the infection. He embarked in the year 1190, with Richard I. king of England, for the relief of the Christians in Palestine who were oppressed by Saladin. Those two monarchs sat down before Acre, which is the ancient Ptolemais; as did almost all the Christians of the east, while Saladin was engaged in a civil war on the banks of the Euphrates. When the two European monarchs had joined their forces to those of the Asiatic Christians, they counted above 300,000 fighting men. Acre surrendered the 13th of July 1191; but the unhappy disagreement which took place between Philip and Richard, rivals of glory and of interest, did more mischief than could be compensated by the successful exertions of those 300,000 men. Philip, tired of these divisions, and displeased with the behaviour of Richard his vassal, returned to his own country, which, perhaps, he should never have left, or at least have seen again with more glory. Besides, he was attacked (say historians) with a languishing disorder, the effects of which were attributed to poison; but which might have been occasioned merely by the scorching heat of a climate so different from that of France. He lost his hair, his beard, and his nails; nay, his very flesh came off. The physicians urged him to return home; and he soon determined to follow their advice. The year after, he obliged Baudouin VIII. count of Flanders to leave him the county of Artois. He next turned his arms against Richard king of England, from whom he took Evreux and Vexin; though he had promised upon the holy gospels never to take any advantage of his rival during his absence; so that the consequences of this war were very unfortunate. The French monarch, repulsed from Rouen with loss, made a truce for six months; during which time he married Ingelburge, princess of Denmark, whose beauty could only be equalled by her virtue. The divorcing of this lady, whom he quitted in order to marry Agnes daughter of the duke of Merania, embroiled him with the court of Rome. The pope issued a sentence of excommunication against him; but it was taken off upon his promising to take back his former wife. John Sans-terre, succeeded to the crown of England in 1199, to the prejudice of his nephew Arthur, to whom of right it belonged. The nephew, supported by Philip,

Philip.

Philip. Philip, took arms against the uncle, but was defeated in Poitou, where he was taken prisoner, and afterwards murdered. The murderer being summoned before the court of the peers of France, not having appeared, was declared guilty of his nephew's death, and condemned to lose his life in 1203. His lands, situated in France, were forfeited to the crown. Philip soon set about gathering the fruit of his vassal's crime. He seized upon Normandy, then carried his victorious arms into Maine, Anjou, Touraine, Poitou, and brought those provinces, as they anciently were, under the immediate authority of his crown. The English had no other part left them in France but the province of Guienne. To crown his good fortune, John his enemy was embroiled with the court of Rome, which had lately excommunicated him. This ecclesiastical thunder was very favourable for Philip. Innocent II. put into his hands, and transferred to him, a perpetual right to the kingdom of England. The king of France, when formerly excommunicated by the pope, had declared his censures void and abusive; he thought very differently, however, when he found himself the executor of a bull investing him with the English crown. To give the greater force to the sentence pronounced by his holiness, he employed a whole year in building 1700 ships, and in preparing the finest army that was ever seen in France. Europe was in expectation of a decisive battle between the two kings, when the pope laughed at both, and artfully took to himself what he had bestowed upon Philip. A legate of the holy see persuaded John Sans terre to give his crown to the court of Rome, which received it with enthusiasm. Then Philip was expressly forbid by the pope to make any attempt upon England, now become a see of the Roman church, or against John who was under her protection. Meanwhile, the great preparations which Philip had made alarmed all Europe; Germany, England, and the Low-Countries were united against him in the same manner as we have seen them united against Louis XIV. Ferrand, count of Flanders, joined the emperor Otho IV. He was Philip's vassal; which was the strongest reason for declaring against him. The French king was nowise disconcerted; his fortune and his courage dissipated all his enemies. His valour was particularly conspicuous at the battle of Bouvines, which was fought on the 27th of July 1214, and lasted from noon till night. Before the engagement, he knew well that some of his nobles followed him with reluctance. He assembled them together; and placing himself in the midst of them, he took a large golden cup, which he filled with wine, and into which he put several slices of bread. He eat one of them himself, and offering the cup to the rest, he said, "My companions, let those who would live and die with me follow my example." The cup was emptied in a moment, and those who were the least attached to him fought with all the bravery that could be expected from his warmest friends. It is also reported, that after showing the army the crown that was worn by sovereigns upon these occasions, he said, "If any one thought himself more worthy than he was to wear it, he had only to explain himself; that he should be content it were the prize of that man who should display the greatest valour in battle." The enemy had

Philip. an army of 150,000 fighting men; that of Philip was not half so numerous; but it was composed of the flower of his nobility. The king ran great hazard of his life; for he was thrown down under the horses feet, and wounded in the neck. It is said 30,000 Germans were killed; but the number is probably much exaggerated. The counts of Flanders and Boulogne were led to Paris with irons upon their feet and hands; a barbarous custom which prevailed at that time. The French king made no conquest on the side of Germany after this ever memorable action; but it gained him an additional power over his vassals. Philip, conqueror of Germany, and possessor of almost all the English dominions in France, was invited to the crown of England by the subjects of King John, who were grown weary of his tyranny. The king of France, upon this occasion, conducted himself like an able politician. He persuaded the English to ask his son Louis for their king; but as he wished at the same time to manage the pope, and not lose the crown of England, he chose to assist the prince his son, without appearing to act himself. Louis made a descent upon England, was crowned at London, and excommunicated at Rome in 1216; but that excommunication made no change upon John's situation, who died of grief. His death extinguished the resentment of the English, who having declared themselves for his son Henry III. forced Louis to leave England. Philip-Augustus died a little time after, at Mantes, the 14th of July 1223, aged 59, after a reign of 43 years. Of all the kings of the 3d race, he made the greatest accession to the crown-lands, and transmitted the greatest power to his successors. He reunited to his dominions Normandy, Anjou, Maine, Touraine, Poitou, &c. After having subdued John Sans-terre, he humbled the great lords, and by the overthrow of foreign and domestic enemies, took away the counterpoise which balanced his authority in the kingdom. He was more than a conqueror; he was a great king and an excellent politician; fond of splendor on public occasions, but frugal in private life; exact in the administration of justice; skilful in employing alternately flattery and threatenings, rewards and punishments; he was zealous in the defence of religion, and always disposed to defend the church; but he knew well how to procure from her succours for supplying the exigencies of the state. The lords of Coucy, Rhetel, Rossey, and several others, seized upon the property of the clergy. A great many of the prelates applied for protection to the king, who promised them his good offices with the depredators. But, notwithstanding his recommendations, the pillages continued. The bishops redoubled their complaints, and intreated Philip to march against their enemies. "With all my heart (said he); but in order to fight them, it is necessary to have troops, and troops cannot be raised without money." The clergy understood his meaning; they furnished subsidies, and the pillages ceased. The enterprises of Philip-Augustus were almost always successful; because he formed his projects with deliberation, and executed them without delay. He began by rendering the French happy, and in the end rendered them formidable; though he was more inclined to anger than to gentleness, to punish than to pardon, he was regretted by his subjects as a powerful genius and

Philip. as the father of his country. It was in his reign that the marshal of France was seen, for the first time, at the head of the army. It was then, also, that families began to have fixed and hereditary surnames; the lords took them from the lands which they possessed; men of letters from the place of their birth; the converted Jews and rich merchants from that of their residence. Two very cruel evils, *viz.* leprosy and usury, were prevalent at that time; the one infected the body, the other proved the ruin of the fortunes of families. The number of lepers was so great, that the smallest villages were obliged to have an hospital for the cure of that distemper. It is remarkable, that when Philip was on the point of engaging Richard, the English, who were lying in ambush near the Loire, run away with his equipages, in which he caused to be carried all the deeds or writings respecting the rights of the crown; a custom which is used at this day by the grand seignior. Philip caused copies of his charters to be collected wherever they could be found; but after all his endeavours, some of them were never recovered. The surname of *Augustus* was given to Philip by his contemporaries. Mezerai is mistaken, when he asserts that Paulus Emilius was the first who rendered the name of *conqueror* by that of *Augustus*; a learned critic has proved the contrary by undoubted authorities.

Philip of Valois, first king of France of the collateral branch of the Valois, was son to Charles count of Valois, brother of Philip the Fair. He mounted the throne in 1328, on the death of his cousin Charles the Fair, after having held for some time the regency of the kingdom. France was much divided in the beginning of his reign, by disputes about the succession to the crown. Edward III. king of England laid claim to it as grandson of Philip the Fair, by his mother; but Philip of Valois took possession of it as first prince of the blood. The people gave him, upon his accession to the throne, the title of *fortunate*; to which might have been added, for some time, those of *victorious* and *just*. He marched to the relief of his vassal the count of Flanders, whose subjects, on account of bad usage, had taken up arms against him. He engaged the rebels at Cassel, performed prodigies of valour, and gained a signal victory, the 24th of August 1328. Having made all quiet, he went home, after saying to the count of Flanders, "Be more prudent and more humane, and you will have fewer disloyal subjects." The victorious Philip devoted the time of peace to the internal regulations of his kingdom. The financiers were called to an account, and some of them condemned to death; among others Peter Remi, general of the finances, who left behind him near 20 millions. He afterwards enacted the law respecting freeholds, imposing a tax upon churches, and commoners who had acquired the lands of the nobility. Then, also, began to be introduced the form of *appeal comme d'abus*, the principles of which are more ancient than the name. The year 1329 was distinguished by a solemn homage paid to Philip, by Edward king of England, for the duchy of Guienne, upon his knees, and with his head uncovered. The interior peace of the kingdom was disturbed by disputes about the distinction of the church and state. An assembly was summoned for hearing the two parties, in the presence of the king: and in this assembly Peter de Cugnières, his

majesty's advocate, defended the secular jurisdiction with great ability as a man well-informed, and an enlightened philosopher. Bertrand bishop of Autun, and Roger archbishop of Sens, pled the cause of the clergy with less ingenuity and judgment. This did not, however, prevent the king from showing them favours, though the controversy itself laid the foundation of all the disputes which were afterwards agitated about the authority of the two powers; disputes which contributed not a little to confine the ecclesiastical jurisdiction within narrower limits. While Philip was employing himself in some useful regulations, he was unhappily interrupted by Edward III. declaring war against France. This prince immediately recovered those parts of Guienne of which Philip was in possession. The Flemish having again revolted from France in spite of oaths and treaties, joined the standard of Edward; and required that he would assume the title of *king of France*, in consequence of his pretensions to the crown; because then, agreeably to the letter of their treaty, they only followed the king of France. From this period is dated the union of the flower-de-luce and leopards in the arms of England. Edward, in order to justify the change of his arms, caused the following manifesto to be published in the verse of the times.

Philip.

*Rex sum regnorum, bina ratione, duorum:
Anglorum in regno sum rex ego jure paterno;
Matris jure quidem Francorum nuncupor idem:
Hinc est armorum variatio facta meorum.*

In the way of a parody to these lines, Philip made the following reply:

*Prædo regnorum qui diceris esse duorum,
Francorum regno privaberis, atque paterno.
Succedunt mares huic regno, non mulieres:
Hinc est armorum variatio stulta tuorum.*

In the mean time Philip put himself in a posture of defence. His arms were at first attended with some success; but those advantages were far from compensating the loss of the battle of Ecluse, in which the French fleet, consisting of 120 large ships, and manned by 40,000 seamen, was beat by that of England in the year 1340. This defeat is to be attributed, in part, to the little attention which had been paid to the navy of France, notwithstanding her favourable situation, by being washed by two seas. She was obliged to make use of foreign ships, which obeyed but slowly, and even with some reluctance. This war, which had been alternately discontinued and renewed, begun again with more heat than ever in 1345. The two armies having come to an engagement the 26th of August 1346, near Crecy, a village in the county of Ponthieu, the English there gained a signal victory. Edward had only 40,000 men, while Philip had nearly twice that number; but the army of the former was inured to war, and that of the latter was ill-disciplined and overcome with fatiguing marches. France lost from 25,000 to 30,000 men; of which numbers were John king of Bohemia (who, though blind, fought gallantly), and about 1500 gentlemen, the flower of the French nobility. The loss of Calais, and several other places, was the sad fruit of this defeat. Some time before Edward had challenged Philip of Valois

Philip.

to a single combat; which he refused, not on the score of cowardice, but from the idea that it was improper for a sovereign prince to accept a challenge from a king who was his vassal. At length, in 1347, a truce for six months was concluded between France and England, and afterwards prolonged at different times. Philip died a short time after, the 23d of August 1350, aged 57 years, and far from bearing on his monument the title of *Fortunate*. He had, however, reunited Dauphiny to France. Humbert, the last prince of that country, having lost all his children, and wearied with the wars which he had held out against Savoy, turned a Dominican, and gave his province to Philip, in 1349, on condition that the eldest son of the kings of France should bear the title of Dauphin. Philip likewise added to his domain Roussillon and a part of Cerdague, by lending some money to the king of Majorca, who gave him those provinces as a security; provinces which Charles VIII. afterwards restored without any reimbursement. It is surprising that in so unfortunate a reign he should have been able to purchase those provinces after having paid a great deal for Dauphiny; but the duty on salt, the rise on the other taxes, and especially the frauds committed in the coinage of money, are supposed to have enabled him to make those acquisitions. The fictitious and ideal value of the coin was not only raised, but a great deal of bad money was issued from the mint. The officers of the mint were sworn upon the gospels to keep the secret: but how could Philip flatter himself that so gross a fraud would not be discovered?

PHILIP II. son of Charles V. and of Isabella of Portugal, who was born at Valladolid on the 21st of May 1527, became king of Naples and Sicily by his father's abdication in 1554. He ascended the throne of Spain on the 17th of January 1556 by the same means. Charles had made a truce with the French, but his son broke it; and having formed an alliance with England, poured into Picardy an army of 40,000 men. The French were cut to pieces at the battle of St Quintin, which was fought on the 20th of August 1557. That town was taken by assault, and the day on which the breach was mounted Philip appeared armed cap-a-pee in order to animate the soldiers. It was the first and last time that he was observed to wear this military dress. It is well known, indeed, that his terror was so great during the action that he made two vows; one, that he should never again be present in a battle; and the other, to build a magnificent monastery dedicated to St Lawrence, to whom he attributed the success of his arms, which he executed at Escorial, a village about seven leagues from Madrid. After the engagement, his general, the Duke of Savoy, wanted to kiss his hand; but Philip prevented him, saying, "It is rather my duty to kiss your's, who have the merit of so glorious a victory;" and immediately presented him with the colours taken during the action. The taking of Catelet, Ham, and Noyon, were the only advantages which were derived from a battle which might have proved the ruin of France. When Charles V. was informed of this victory, it is said he asked the person who brought him the intelligence, "if his son was at Paris?" and being answered in the negative, he went away without uttering a single word. The Duke of Guise having had time to

assemble an army, repaired the disgrace of his country by the taking of Calais and Thionville. While he was animating the French, Philip gained a pretty considerable battle against Marshall de Thermes near Gravelines. His army was, on this occasion, commanded by Count Egmont, whom he afterwards caused to be beheaded. The conqueror made no better use of the victory of Gravelines than he had done of that of St Quintin; but he reaped considerable advantage from the glorious peace of Cateau-Cambresis, the master-piece of his politics. By that treaty, concluded the 13th of April 1559, he gained possession of the strong places of Thionville, Marienbourg, Montmedi, Hesdin, and the county of Charollois. This war, so terrible, and attended with so much cruelty, was terminated, like many others, by a marriage. Philip took for his third wife Elizabeth, daughter of Henry II. who had been promised to Don Carlos.

After these glorious achievements, Philip returned in triumph to Spain, without having drawn a sword. His first care, upon his arrival at Valladolid, was to demand of the grand inquisitor the spectacle of an *auto-da-fé*. This was immediately granted him; 40 wretches, some of whom were priests or monks, were strangled and burnt, and one of them was burnt alive. Don Carlos de Seza, one of those unfortunate victims, ventured to draw near to the king, and said to him, "How, Sir, can you suffer so many wretches to be committed to the flames? Can you be witness of such barbarity without weeping?" To this Philip coolly replied, "If my own son were suspected of heresy, I would myself give him up to the severity of the inquisition. Such is the horror which I feel when I think of you and your companions, that if an executioner were wanting, I would supply his place myself." On other occasions he conducted himself agreeably to the spirit which had dictated this answer. In a valley of Piedmont, bordering on the country of the Milanese, there were some heretics; and the governor of Milan had orders to put them all to death by the gibbet. The new opinions having found their way into some of the districts of Calabria, he gave orders that the innovators should be put to the sword, with the reservation of 60 of them, of whom 30 were afterwards strangled, and the rest committed to the flames.

This spirit of cruelty, and shameful abuse of his power, had the effect to weaken that power itself. The Flemish, no longer able to bear so hard a yoke, revolted. The revolution began with the fine and large provinces of the continent; but the maritime provinces only obtained their liberty. In 1579 they formed themselves into a republic, under the title of the United Provinces. Philip sent the Duke of Alba to reduce them; but the cruelty of that general only served to exasperate the spirit of the rebels. Never did either party fight with more courage, or with more fury. The Spaniards, at the siege of Haerlem, having thrown into the town the head of a Dutch officer who had been killed in a skirmish, the inhabitants threw to them the heads of eleven Spaniards, with this inscription: "Ten heads for the payment of the tenth penny, and the eleventh for interest." Haerlem having surrendered at discretion, the conquerors caused all the magistrates, all the pastors, and above 1500 citizens, to be hanged.

Philip.

Philip.

The Duke of Alba, being at length recalled, the grand commander of the Requesnes was sent in his place, and after his death Don John of Austria; but neither of those generals could restore tranquillity in the Low Countries. To this son of Charles V. succeeded a grandson no less illustrious, namely, Alexander Farnese duke of Parma, the greatest man of his time; but he could neither prevent the independence of the United Provinces, nor the progress of that republic which arose under his own eye. It was then that Philip, always at his ease in Spain, instead of coming to reduce the rebels in Flanders, proscribed the Prince of Orange, and set 25,000 crowns upon his head. William, superior to Philip, disdained to make use of that kind of vengeance, and trusted to his sword for his preservation.

In the mean time the king of Spain succeeded to the crown of Portugal, to which he had a right by his mother Isabella. This kingdom was subjected to him by the Duke of Alba, in the space of three weeks, in the year 1580. Antony, prior of Crato, being proclaimed king by the populace of Lisbon, had the resolution to come to an engagement; but he was vanquished, pursued, and obliged to fly for his life.

A cowardly assassin, Balthazar Gerard, by a pistol-shot killed the Prince of Orange, and thereby delivered Philip from his most implacable enemy. Philip was charged with this crime, it is believed without reason; though, when the news was communicated to him, he was imprudent enough to exclaim, "If this blow had been given two years ago, the Catholic religion and I would have gained a great deal by it."

This murder had not the effect to restore to Philip the Seven United Provinces. That republic, already powerful by sea, assisted England against him. Philip having resolved to distress Elizabeth, fitted out, in 1588, a fleet called the *Invincible*. It consisted of 150 large ships, on which were counted 2650 pieces of cannon, 8000 seamen, 20,000 soldiers, and all the flower of the Spanish nobility. This fleet, commanded by the Duke of Medina Sidonia, sailed from Lisbon when the season was too far advanced; and being overtaken by a violent storm, a great part of it was dispersed. Twelve ships, driven upon the coast of England, were captured by the English fleet, which consisted of 100 ships; 50 were wrecked on the coasts of France, Scotland, Ireland, Holland, and Denmark. Such was the success of the *Invincible*. See ARMADA.

This enterprise, which cost Spain 40 millions of ducats, 20,000 men, and 100 ships, was productive only of disgrace. Philip supported this misfortune with an heroic resolution. When one of his courtiers told him, with an air of consternation, what had happened, he coolly replied, "I sent to fight the English, and not the winds. God's will be done." The day after Philip ordered the bishops to return thanks to God for having preserved some remains of his fleet; and he wrote thus to the pope: "Holy father, as long as I remain master of the fountain head, I shall not much regard the loss of a rivulet. I will thank the Supreme Disposer of empires, who has given me the power of easily repairing a disaster which my enemies must attribute solely to the elements which have fought for them."

At the same time that Philip attacked England, he was encouraging in France the Holy League; the ob-

ject of which was to overturn the throne and divide the state. The leaguers conferred upon him the title of *Protector* of their association; which he eagerly accepted, from a persuasion that their exertions would soon conduct him, or one of his family, to the throne of France. He thought himself so sure of his prey, that when speaking of the principal cities in France, he used to say, "My fine city of Paris, my fine city of Orleans," in the same manner as he would have spoken of Madrid and Seville. What was the result of all those intrigues? Henry IV. embraced the Catholic religion, and by his abjuration of Protestantism made his rival lose France in a quarter of an hour.

Philip, at length, worn out by the debaucheries of his youth, and by the toils of government, drew near his last hour. A slow fever, the most painful gout, and a complication of other disorders, could not disengage him from business, nor draw from him the least complaint. "What!" said he to the physicians who hesitated about letting blood of him; "What! are you afraid of drawing a few drops of blood from the veins of a king who has made whole rivers of it flow from heretics?" At last, exhausted by a complication of distempers, which he bore with an heroic patience, and being eaten up of lice, he expired the 13th of September 1598, aged 72 years, after a reign of 43 years and eight months. During the last 50 days of his illness he showed a great sense of religion, and had his eyes almost always fixed towards heaven.

No character was ever drawn by different historians in more opposite colours than that of Philip; and yet, considering the length and activity of his reign, there is none which it should seem would be more easy to ascertain. From the facts recorded in history, we cannot doubt that he possessed, in an eminent degree, penetration, vigilance, and a capacity for government. His eyes were continually open upon every part of his extensive dominions. He entered into every branch of administration; watched over the conduct of his ministers with unwearied attention; and in his choice both of them and of his generals discovered a considerable share of sagacity. He had at all times a composed and settled countenance, and never appeared to be either elated or depressed. His temper was the most imperious, and his looks and demeanor were haughty and severe; yet among his Spanish subjects he was of easy access; listened patiently to their representations and complaints; and where his ambition and bigotry did not interfere, was generally willing to redress their grievances. When we have said thus much in his praise, we have said all that truth requires or truth permits. It is indeed impossible to suppose that he was insincere in his zeal for religion. But as his religion was of the most corrupt kind, it served to increase the natural depravity of his disposition; and not only allowed, but even prompted, him to commit the most odious and shocking crimes. Although a prince in the bigotted age of Philip might be persuaded that the interest of religion would be advanced by falsehood and persecution; yet it might be expected, that, in a virtuous prince, the sentiments of honour and humanity would on some occasions triumph over the dictates of superstition: but of this triumph there occurs not a single instance in the reign of Philip; who without hesitation violated his most sacred obli-

Watson's
Philip II.

Philip.

gations as often as religion afforded him a pretence, and under that pretence exercised for many years the most unrelenting cruelty without reluctance or remorse. His ambition, which was exorbitant; his resentment, which was implacable; his arbitrary temper, which would submit to no controul—concurrent with his bigotted zeal for the Catholic religion, and carried the sanguinary spirit, which that religion was calculated to inspire, to a greater height in Philip than it ever attained in any other prince of that or of any former or succeeding age.

Though of a small size, he had an agreeable person. His countenance was grave, his air tranquil, and one could not discover from his looks either joy in prosperity or chagrin in adversity. The wars against Holland, France, and England, cost Philip 564 millions of ducats; but America furnished him with more than the half of that sum. His revenues, after the junction of Portugal, are said to have amounted to 25 millions of ducats, of which he only laid out 100,000 for the support of his own household. Philip was very jealous of outward respect; he was unwilling that any should speak to him but upon their knees. The duke of Alba having one day entered this prince's cabinet without being introduced, he received the following harsh salutation, accompanied with a stormy countenance: "An impudence like this of yours would deserve the hatchet." If he thought only how to make himself be feared, he succeeded in doing so; for few princes have been more dreaded, more abhorred, or have caused more blood to flow, than Philip II. of Spain. He had successively, if not all at once, war to maintain against Turkey, France, England, Holland, and almost all the Protestants of the empire, without having a single ally, not even the branch of his own house in Germany. Notwithstanding so many millions employed against the enemies of Spain, Philip found in his œconomy and his resources wherewith to build 30 citadels, 64 fortified places, 9 sea-ports, 25 arsenals, and as many palaces, without including the escurial. His debts amounted to 140 millions of ducats, of which, after having paid seven millions of interest, the greatest part was due to the Genoese. Moreover, he had sold or alienated a capital stock of 100 millions of ducats in Italy. He made a law, fixing the majority of the kings of Spain at 14 years of age. He affected to be more than commonly devout; he eat often at the refectory with the monks; he never entered their churches without kissing all the relics; he caused knead his bread with the water of a fountain which was thought to possess a miraculous virtue; he boasted of never having danced, and of never wearing breeches after the Grecian fashion. Grave and solemn in all his actions, he drove from his presence a woman who had smiled while he was blowing his nose. One great event of his domestic life is the death of his son Don Carlos. The manner of this prince's death is not certainly known. His body, which lies in the monument of the escurial, is there separated from his head; but it is pretended that the head is separated only because the leaden coffin which contains the body is too small. The particulars of his crime are as little known as the manner in which it was committed. There is no evidence, nor is there any probability, that Philip would have caused him to be con-

demned by the inquisition. All that we know of the matter is, that in 1568 his father, having discovered that he had some correspondence with the Hollanders his enemies, arrested him himself in his own room. He wrote at the same time to Pope Pius V. in order to give him an account of his son's imprisonment; and in his letter to this pontiff, the 20th of January 1568, he says, "that from his earliest years the strength of a wicked nature has stifled in Don Carlos every paternal instruction." It was Philip II. who caused to be printed at Anvers, between 1569 and 1572, in 8 vols folio, the fine Polyglot Bible, which bears his name; and it was he who subjected the islands afterwards called the *Philippines*. He married successively, 1st, Mary daughter of John III. king of Portugal; 2dly, Mary daughter of Henry VIII. and queen of England; 3dly, Elizabeth of France, daughter of Henry II.; 4thly, Anne, daughter of the Emperor Maximilian II. Don Carlos was the son of his first wife, and Philip III. of the last.

PHILIPPI (anc. geog.), a town of Macedonia, in the territory of the Edones, on the confines of Thrace (Pliny, Ptolemy), situated on the side of a steep eminence; anciently called *Datum* and *Drenides* (Appian), though Strabo seems to distinguish them. This town was famous on several accounts; not only as taking its name from the celebrated Philip of Macedon, father to Alexander the Great, who considered it as a fit place for carrying on the war against the Thracians; but also on account of two battles fought in its neighbourhood between Augustus and the republican party. In the first of these battles, Brutus and Cassius had the command of the republican army; while Octavianus, afterwards Augustus, and Mark Antony, had the command of their adversaries. The army of Brutus and Cassius consisted of 19 legions and 20,000 horse; the imperial forces of an equal number of legions, but more complete, and 13,000 horse; so that the numbers on both sides were pretty equal. The troops of Brutus were very richly dressed, most of them having their armour adorned with gold and silver; for Brutus, though very frugal in other respects, was thus extravagant with respect to his men, thinking that the riches that they had about them would make them exert themselves the more, to prevent these from falling into the enemy's hands. Both the republican generals appear to have been inferior in skill to Mark Antony; for as to Octavianus, he is allowed never to have conquered but by the valour of others. A little before the first engagement, Octavianus, who had been indisposed, was carried out of the camp, at the persuasion of Artorius his physician, who had dreamed that he saw a vision directing him to be removed. Brutus's men, who opposed the wing commanded by Octavianus, charged without orders, which caused great confusion. However, they were successful; for part of them, taking a compass about, fell upon the enemy's rear: after which they took and plundered the camp, making a great slaughter of such as were in it, and among the rest putting 2000 Lacedæmonians to the sword who were newly come to the assistance of Octavianus. The emperor himself was sought for, but in vain, having been conveyed away for the reason above-mentioned; and as the soldiers pierced the litter in which he was usually carried, it was thence reported that

Philippi, Philippics. that he had been killed. This threw that whole part of the army into such consternation, that when Brutus attacked them in front, they were most completely routed; three whole legions being cut in pieces, and a prodigious slaughter made among the fugitives. But by the imprudence of the general in pursuing too far, the wing of the republican army commanded by Cassius was left naked and separated from the rest of the army; on which they were attacked at once in front and in flank, and thus they were defeated and their camp taken, while Brutus imagined that he had gained a complete victory. Cassius himself retired to an eminence at a small distance from Philippi; whence he sent one of his greatest intimates to procure intelligence concerning the fate of Brutus. That general was on his way, and already in view, when the messenger set out. He soon met his friends; but they surrounding him to inquire the news, Cassius, who beheld what passed, imagined that he was taken prisoner by the enemy, retired to his tent, and in despair caused one of his freedmen cut off his head. Thus far at least is certain, that he went into the tent with that freedman, and that his head was found separated from his body when Brutus entered. However, the freedman was never afterwards seen.

The second engagement was pretty similar to the first. Brutus again opposed Octavianus, and met with the same success; but in the mean time Antony, to whom he ought undoubtedly to have opposed himself, having to do only with the lieutenants of Cassius, gained a complete victory over them. What was worst, the fugitives, instead of leaving the field of battle altogether, fled for protection to Brutus's army; where, crowding in among the ranks, they carried despair and confusion wherever they went, so that a total defeat ensued, and the republican army was almost entirely cut in pieces. After the battle, Brutus put an end to his own life, as is related more fully under the article **ROME**.

The city of Philippi is likewise remarkable on account of an epistle written by St Paul to the church in that place. It was a Roman colony (Luke, Pliny, Coin, Inscription). It is also remarkable for being the birth-place of Adrastus, the Peripatetic philosopher, and disciple of Aristotle.—The town is still in being, and is an archbishop's see; but greatly decayed and badly peopled. However, there is an old amphitheatre, and several other monuments of its ancient grandeur. E. Long. 44. 55. N. Lat. 41. 0.

PHILIPPICS, *Φιλιππικοί λόγοι*, in literature, is a name which is given to the orations of Demosthenes against Philip king of Macedon. The Philippics are reckoned the master-pieces of that great orator: Longinus quotes many instances of the sublime from them; and points out a thousand latent beauties. Indeed that pathetic in which Demosthenes excelled, the frequent interrogations and apostrophes wherewith he attacked the indolence of the Athenians, where could they be better employed? Whatever delicacy there be in the oration against Leptines, the Philippics have the advantage over it, were it only on account of the subject, which gives Demosthenes so fair a field to display his chief talent, we mean, with Longinus, that of moving and astonishing.

Dionysius Halicarnassensis ranks the oration on the

Halonese among the Philippics, and places it the eighth in order: but though his authority be great, yet that force and majesty wherein Cicero characterises the Philippics of Demosthenes, seem to exclude the oration on the Halonese out of the number; and authorise the almost universal opinion of the learned, who reject it as spurious. Libanius, Photius, and others, but above all the languidness of the style, and the lowness of the expressions, which reign throughout the whole, father it on Hegesippus.

PHILIPPIC is likewise applied to the fourteen orations of Cicero against Mark Antony. Cicero himself gave them this title in his epistles to Brutus; and posterity have found it so just, that it has been continued to our times. Juvenal, Sat. x. calls the second the *divine Philippic*, and witnesses it to be of great fame, *conspiciæ divina Philippica fama*. That orator's intitling his last and most valued orations after the Philippics of Demosthenes shows the high opinion he had of them. Cicero's Philippics cost him his life; Mark Antony having been so irritated with them, that when he arrived at the triumvirate, he procured Cicero's murder, cut off his head, and stuck it up in the very place whence the orator had delivered the Philippics.

PHILIPPINE ISLANDS, are certain islands of Asia, which lie between 114 and 126 degrees of east longitude, and between 6 and 20 degrees of north latitude; about 300 miles south-east of China. They *Bealson's* are said to be about 1200 in number, of which there *Mil. Mem.* are 400 very considerable. They form a principal division of that immense Indian Archipelago, which consists of so many thousand islands, some of which are the largest, and many of them the richest, in the world. The Philippines form the northernmost cluster of these islands, and were discovered in the year 1521 by the famous navigator Ferdinand Magellan, a Portuguese gentleman, who had served his native country both in the wars of Africa and in the East Indies; particularly under Albuquerque, the famous Portuguese general, who reduced Goa and Malacca to the obedience of that crown. Magellan having had a considerable share in those actions, and finding himself neglected by the government of Portugal, and even denied, as it is said, the small advance of a ducat a month in his pay, left the court of Portugal in disgust, and offered his services to Charles V. then emperor of Germany and king of Spain, whom he convinced of the probability of discovering a way to the Spice Islands, in the East Indies, by the west; whereupon the command of five small ships being given him, he set sail from Seville, on the 10th of August 1519, and standing over to the coast of South America, proceeded southward to 52°, where he fortunately hit upon a strait, since called the *Strait of MAGELLAN*, which carried him into the Pacific Ocean or South Sea; and then steering northward, repassed the equator: after which, he stretched away to the west, across that vast ocean, till he arrived at Guam, one of the Ladrões, on the 10th of March 1521; and soon after sailed to the westward, and discovered the Philippines, which he did on St Lazarus's day; and, in honour of that saint, he called them the *Archipelago of St Lazarus*. He took possession of them in the name of the king of Spain, but happened to be killed in a skirmish he had with the natives of one of them. His people, however,

Philippic, Philippine Islands.

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however, arrived afterwards at the Moluccas, or Clove Islands, where they left a colony, and returned to Spain by the way of the Cape of Good Hope; being the first persons that ever sailed round the globe.— But there was no attempt made by the Spaniards to subdue or plant the Philippine Islands until the year 1564, in the reign of Philip II. son of Charles V. when Don Louis de Velasco, viceroy of Mexico, sent Michael Lopez Delagaspes thither with a fleet, and a force sufficient to make a conquest of these islands, which he named the *Philippines*, in honour of Philip II. then upon the throne of Spain; and they have remained under the dominion of that crown till taken by Sir William Draper. The Philippines are scarce inferior to any other islands of Asia in all the natural productions of that happy climate; and they are by far the best situated for an extensive and advantageous commerce. By their position, they form the centre of intercourse with China, Japan, and the Spice Islands; and whilst they are under the dominion of Spain, they connect the Asiatic and American commerce, and become a general magazine for the rich manufactures of the one and for the treasures of the other. Besides, they are well situated for a supply of European goods, both from the side of Acapulco and by the way of the Cape of Good Hope. In fact, they formerly enjoyed a traffic in some degree proportioned to the peculiar felicity of their situation; but the Spanish dominion is too vast and unconnected to be improved to the best advantage.— The spirit of commerce is not powerful in that people. The trade of the Philippines is thought to have declined; its great branch is now reduced to two ships, which annually pass between these islands and Acapulco in America, and to a single port of Manila in the island of Luconia.

Indeed the Spaniards appear by no means to be actuated by the spirit of industry; for, so far from improving the fine situation of these islands to the utmost, it happens, on the contrary, that the trade is hurtful to the mother-country; for (to confine ourselves to Manila, with which they have most to do), instead of taking Spanish manufactures, they trade with the Chinese for spices, silks, stockings, Indian stuffs, calicoes, chintz, and many other articles; and with the Japanese for cabinets, and all sorts of lacquered ware; for all which they pay in gold or silver. All these commodities, together with what the islands produce, and great quantities of wrought plate by the Chinese artisans, are collected at Manila, and transported annually in two ships to Acapulco in Mexico. Each of these ships is esteemed worth L. 600,000 Sterling; and in the war which began in 1739, and which was not distinguished by such a series of wonderful successes as that which ended in 1763, the taking of one of the galleons which carry on the trade between Manila and America, was considered as one of the most brilliant advantages which we gained. This trade is not laid open to all the inhabitants of Manila, but is confined by very particular regulations, somewhat analogous to those by which the trade of the register ships

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from Cadiz to the West Indies is restrained. The ships employed are all king's ships, commissioned and paid by him; and the tonage is divided into a certain number of bales, all of the same size. These are divided among the convents at Manila, but principally the Jesuits (A), as a donation to support their missions, for the propagation of the Roman Catholic faith. Most of the religious are concerned in this trade, and sell to the merchants at a great price what room in the ship they are not to occupy. This trade is by a royal edict limited to a certain value, but it always exceeds it, each ship being generally worth 3,000,000 of dollars. The returns made from America are in silver, cochineal, sweetmeats, together with some European millinery ware for the women, and some strong Spanish wine. It is obvious, that the greatest part of the treasure remitted does not remain at Manila, but is dispersed over India for goods. Many strong remonstrances against this Indian trade to Mexico have been made to the court of Spain, wherein they urge, that the silk manufactories of Valencia and other parts of Spain, the linens from Cadiz, and their other manufactories, are hurt in their sale in Mexico and Peru, by the Chinese being able to afford them goods of the same sort cheaper than they are able; that were this trade laid open, the whole treasure of the New World would centre in Spain, or with European merchants; but now it enriches only the Jesuits and a few private persons. Wise as these arguments are, the Jesuits and priests, versant in intrigue, and the most selfish set of men on earth, had interest enough at court to stop the effect.

At Cavite in this bay are a fort, a town, and a fine dock-yard, where these large galleons are built and repaired, and where they load and unload, together with all the other large ships that trade to this bay.

The principal of the Philippine islands are Luconia or Manila, Tandago or Samul, Masbate, Mindora, Luban, Paragoa, Panay, Leyte, Bohel, Sibuyan, Sogbu, Negros, St John, Xolo, and Mindanao. In most of these, the Spanish power prevails, and all are under the governor of Luconia; but there are some in which that nation has little authority, or even influence, such as Mindanao.

The inhabitants of these islands consist of Chinese, Ethiopians, Malays, Spaniards, Portuguese, Pintados or Painted People, and Mestees, a mixture of all these. Their persons and habits resemble those of the several nations whence they derive their original; only, it is observable, that the features of the blacks of these islands are as agreeable as those of the white people. There is not a soil in the world that produces greater plenty of all things for life; as appears by the multitude of inhabitants to be found in the woods and mountains, who subsist almost entirely by the fruits of the earth, and the venison they take. Nor can any country appear more beautiful; for there is a perpetual verdure, and buds, blossoms, and fruit, are found upon the trees all the year round, as well on the mountains as in the cultivated gardens. Vast quantities

(A) We do not know who has the Jesuits share since they were expelled the Spanish dominions.

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ties of gold are washed down from the hills by the rains, and found mixed with the sand of their rivers. There are also mines of other metals, and excellent load-stones found here; and such numbers of wild buffaloes, that a good huntsman on horseback, armed with a spear, will kill 10 or 20 in a day. The Spaniards take them for their hides, which they sell to the Chinese; and their carcases serve the mountaineers for food. Their woods also abound with deer, wild hogs, and goats. Of the last, there is such plenty in one of these islands, that the Spaniards gave it the name of *Cabras*. Horses and cows have been likewise imported into these islands, from New Spain, China, and Japan, which have multiplied considerably; but the sheep that were brought over came to nothing. The trees produce a great variety of gums; one kind, which is the commonest, by the Spaniards called *brea*, is used instead of pitch; of the others some are medicinal, others odoriferous.

In those islands are monkeys and baboons of a monstrous bigness, that will defend themselves if attacked by men. When they can find no fruit in the mountains, they go down to the sea to catch crabs and oysters; and that the oysters may not close and catch their paws, they first put in a stone to prevent their shutting close: they take crabs by putting their tail in the holes where they lie, and when the crab lays hold of it, they draw him out. There are also great numbers of civet-cats in some of the islands. The bird called *tavan*, is a black sea-fowl, something less than a hen, and has a long neck; it lays its eggs in the sand by the sea-side, 40 or 50 in a trench, and then covers them, and they are hatched by the heat of the sun. They have likewise the bird *saligan*, which builds her nest on the sides of rocks, as the swallows do against a wall; and these are the delicious *BIRDS-NESTS* so much esteemed, being a kind of jelly that dissolves in warm water.

The Spaniards have introduced several of the American fruits, which thrive here as well as in America; the cocoa or chocolate-nut particularly, which increases so that they have no occasion now to import it from Mexico. Here is also the *FOUNTAIN-TREE*, from which the natives draw water; and there is likewise a kind of cane, by the Spaniards called *vaxuco*, which, if cut, yields fair water enough for a draught, of which there are plenty in the mountains, where water is most wanted.

These islands being hot and moist, produce abundance of venomous creatures, as the soil does poisonous herbs and flowers, which do not kill those who touch or taste them, but so infect the air, that many people die in the time of their blossoming.

The orange, lemon, and several other trees, bear twice a year. A sprig, when planted, becomes a tree and bears fruit in a year's time; so that without any hyperbole it may be affirmed, that a more luxuriant verdant soil can scarcely be conceived. The woods are filled with old, large, and lofty trees, and such as yield more sustenance to man than is to be found in almost any other part of the world. These islands, however, besides their other inconveniences, of which they have many, are very subject to earthquakes, which often prove very fatal. See *MANILA*.

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PHILIPPINES, a religious society of young women at Rome, so called from their taking St Philip de Neri for their protector. The society consists of 100 poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of some religious women, who teach them to read, write, and work, and instruct them in the duties of Christianity. They wear a white veil and a black cross on their breasts. See *MACEDONIA*.

PHILIPPISTS, a sect or party among the Lutherans; the followers of Philip Melancthon. He had strenuously opposed the Ubiquists, who arose in his time; and the dispute growing still hotter after his death, the university of Wittenberg, who espoused Melancthon's opinion, were called by the Flacians, who attacked it, *Philippists*.

PHILIPS (Fabian), was author of several books relating to ancient customs and privileges in England. He was born at Prestbury in Gloucestershire, September 28th 1601. When very young, he spent some time in one of the Inns of Chancery; and went from thence to the Middle-Temple, where he became learned in the law. In the civil wars, he was a bold assertor of the king's prerogative; and was so passionate a lover of Charles I. that, two days before that illustrious monarch was beheaded, he wrote a protestation against the intended murder, and caused it to be printed, and affixed to posts in all public places. He likewise published, in 1649, 4to, a pamphlet intitled, "*Veritas Inconculsa*; or King Charles I. no Man of Blood, but a Martyr for his People:" which was reprinted in 1660, 8vo. In 1663, when the courts of justice at Westminster, especially the Chancery, were voted down by Oliver's parliament, he published, "Considerations against the dissolving and taking them away:" for which he received the thanks of William Lenthall, Esq; speaker of the late parliament, and of the keepers of the liberties of England. He was for some time filazer for London, Middlesex, Cambridgeshire, and Huntingdonshire; and spent much money in searching records, and writing in favour of the royal prerogative. The only advantage he received for this attachment to the royal cause was, the place of one of the commissioners for regulating the law, worth L. 200 *per annum*, which only lasted two years. After the Restoration of Charles II. when the bill for taking away the tenures was depending in parliament, he wrote and published a book to show the necessity of preserving them, intitled, "*Tenenda non tollenda*;" or, the Necessity of preserving Tenures *in capite*, and by Knight's-service, which, according to their first institution, were, and are yet, a great part of the *salus populi*, &c. 1660," 4to. In 1663 he published, "The Antiquity, Legality, Reason, Duty, and Necessity of Pre-emption and Pourveyance for the King," 4to; and afterwards many other pieces upon subjects of a similar kind. He assisted Dr Bates in his "*Elenchus Motuum*;" especially in searching the records and offices for that work. He died, November 17th, 1690, in his 89th year; and was buried near his wife in the church of Twyford in Middlesex. He was a man well acquainted with records and antiquities; but his manner of writing is neither close nor well digested. He published a political pamphlet in 1681, intitled,

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intituled, "*Urfa Major et Minor*; showing that there is no such Fear, as is factitiously pretended, of Popery and arbitrary Power."

PHILIPS (Ambrose), an English poet, was descended from a very ancient and considerable family of that name in Leicestershire. He received his education at St John's college, Cambridge; during his stay at which university, he wrote his pastorals, which acquired him at the time so high a reputation. His next performance was, *The Life of Archbishop Williams*, written, according to Mr Cibber, to make known his political principles, which in the course of it he had a free opportunity of doing, as the archbishop, who is the hero of his work, was a strong opponent to the high-church measures.

When he quitted the university, and came to London, he became a constant attendant at, and one of the wits of, Button's coffee-house, where he obtained the friendship and intimacy of many of the celebrated geniuses of that age, more particularly of Sir Richard Steele, who, in the first volume of his *Tatler*, has inserted a little poem of Mr Philips's, which he calls a *Winter Piece*, dated from Copenhagen, and addressed to the earl of Dorset, on which he bestows the highest encomiums; and, indeed, so much justice is there in these his commendations, that even Mr Pope himself, who had a fixed aversion for the author, while he affected to despise his other works, used always to except this from the number.

The first dislike Mr Pope conceived against Mr Philips, proceeded from that jealousy of fame which was so conspicuous in the character of that great poet; for Sir Richard Steele had taken so strong a liking to the pastorals of the latter, as to have formed a design for a critical comparison of them with those of Pope, in the conclusion of which the preference was to have been given to Philips. This design, however, coming to Mr Pope's knowledge, that gentleman, who could not bear a rival near the throne, determined to ward off this stroke by a stratagem of the most artful kind; which was no other than taking the same task on himself; and, in a paper in the *Guardian*, by drawing the like comparison, and giving a like preference, but on principles of criticism apparently fallacious, to point out the absurdity of such a judgment. However, notwithstanding the ridicule that was drawn on him in consequence of his standing as it were in competition with so powerful an antagonist, it is allowed, that there are, in some parts of Philips's pastorals, certain strokes of nature, and a degree of simplicity, that are much better suited to the purposes of pastoral, than the more correctly turned periods of Mr Pope's versification. Mr Philips and Mr Pope being of different political principles, was another cause of enmity between them; which arose at length to so great a height, that the former, finding his antagonist too hard for him at the weapon of wit, had even determined on making use of a rougher kind of argument; for which purpose he even went so far as to hang up a rod at Button's for the chastisement of his adversary whenever he should come thither; which, however, Mr Pope declining to do, avoided the *argumentum baculinum*, in which he would, no doubt, have found himself on the weakest side of the question. Our author also wrote

several dramatical pieces; *The Briton*, *Distressed Mother*, and *Humphrey Duke of Gloucester*; all of which met with success, and one of them is at this time a standard of entertainment at the theatres, being generally repeated several times in every season. Mr Philips's circumstances were in general, through his life, not only easy, but rather affluent, in consequence of his being connected, by his political principles, with persons of great rank and consequence. He was concerned with Dr Hugh Boulter, afterwards archbishop of Armagh, the right honourable Richard West, Esq; lord chancellor of Ireland, the reverend Mr Gilbert Burnet, and the reverend Mr Henry Stevens, in writing a series of papers called the *Free Thinker*, which were all published together by Mr Philips, in three volumes in 12mo.

In the latter part of Queen Anne's reign, he was secretary to the Hanover club, who were a set of noblemen and gentlemen who had formed an association in honour of that succession, and for the support of its interests, and who used particularly to distinguish in their toasts such of the fair sex as were most zealously attached to the illustrious House of Brunswick. Mr Philips's station in this club, together with the zeal shown in his writings, recommended him to the notice and favour of the new government. He was, soon after the accession of king George I. put into the commission of the peace, and appointed one of the commissioners of the lottery. And, on his friend Dr Boulter's being made primate of Ireland, he accompanied that prelate across St George's Channel, where he had considerable preferments bestowed on him, and was elected a member of the House of Commons there, as representative for the county of Armagh. At length, having purchased an annuity for life of 400 l. *per annum*, he came over to England some time in the year 1748; but having a very bad state of health, and being moreover of an advanced age, he died soon after, at his lodgings near Vauxhall, in Surry.

"Of his personal character (says Dr Johnson) all I have heard is, that he was eminent for bravery, and skill in the sword, and that in conversation he was solemn and pompous." He is somewhere called *Quaker Philips*, but, however, appears to have been a man of integrity; for the late Paul Whitehead relates, that when Mr Addison was secretary of state, Philips applied to him for some preferment, but was coolly answered, "that it was thought that he was already provided for, by being made a justice for Westminster." To this observation our author, with some indignation, replied, "Though poetry was a trade he could not live by, yet he scorned to owe subsistence to another which he ought not to live by."

The following anecdote is told of our author by Dr Johnson: "At a coffee-house, he (Philips) was discoursing upon pictures, and pitying the painters, who, in their historical pieces, always draw the same sort of *sky*. "They should travel (said he), and then they would see that there is a different *sky* in every country, in England, France, Italy, and so forth." "Your remark is just (said a grave gentleman who sat by), I have been a traveller, and can testify what you observe is true; but the greatest variety of *skies* that I found was in Poland." "In Poland, Sir? (says Philips)."

Philips.

Philips. lips)." "Yes, in Poland; for there is Sobiesky, and Sabrunsky, and Jablonky, and Podebrasky, and many more skies."

PHILIPS (Catharine), a very ingenious lady, the daughter of Mr John Fowler merchant, was born at London in January 1631, and educated at a school at Hackney. She married James Philips of the priory of Cardigan, Esq; and went with the viscountess of Dungannon into Ireland, where she translated Corneille's tragedy of Pompey into English, which was several times acted there with great applause.

She translated also the four first acts of Horace, another tragedy of Corneille, the fifth being done by Sir John Denham. This excellent and amiable lady, for such it seems she was, died of the smallpox in London, the 22d of June 1664, much and justly regretted; "having not left (says Langbaine) any of her sex her equal in poetry.—She not only equalled (adds he) all that is reported of the poetesses of antiquity, the Lesbian Sappho and the Roman Sulpitia, but justly found her admirers among the greatest poets of our age." Cowley wrote an ode upon her death. Dr Jeremy Taylor had addressed to her his "Measures and Offices of Friendship:" the second edition of which was printed in 1657, 12mo. She assumed the name of *Orinda*. In 1667, were printed, in folio, "Poems by the most deservedly admired Mrs Catharine Philips, the matchless Orinda. To which is added, Monsieur Corneille's Pompey and Horace, tragedies. With several other translations from the French;" and her picture before them, engraven by Faithorne. There was likewise another edition in 1678, folio; in the preface of which we are told, that "she wrote her familiar letters with great facility, in a very fair hand, and perfect orthography; and if they were collected with those excellent discourses she wrote on several subjects, they would make a volume much larger than that of her poems." In 1705, a small volume of her letters to Sir Charles Cottril were printed under the title of "Letters from Orinda to Poliarchus. The editor of these letters tells us, that "they were the effect of an happy intimacy between herself and the late famous Poliarchus, and are an admirable pattern for the pleasing correspondence of a virtuous friendship. They will sufficiently instruct us, how an intercourse of writing between persons of different sexes ought to be managed with delight and innocence; and teach the world not to load such a commerce with censure and detraction, when it is removed at such a distance from even the appearance of guilt."

PHILIPS (John), an eminent English poet, was born in 1676. He was educated at Winchester and Oxford, where he became acquainted with Milton, whom he studied with great application, and traced in all his successful translations from the ancients. The first poem which distinguished our author, was his *Splendid Shilling*, which is in the *Tatler* styled the *finest burlesque poem in the English language*. His next was intitled *Blenheim*, which he wrote at the request of the earl of Oxford, and Mr Henry St John, afterwards Lord Bolingbroke, on the victory obtained there by the duke of Marlborough in 1704. It was published in 1705; and the year after he finished another poem upon cyder, the first book of which had been

written at Oxford. It is on the model of Virgil's Georgics, and is a very excellent piece. We have no more of Mr Philips but a Latin ode to Henry St John, Esq; which is esteemed a masterpiece. He was contriving greater things; but illness coming on, he was obliged to drop every thing but the care of his health. This care, however, did not save him: for, after lingering a long time, he died at Hereford, Feb. 15. 1708, of a consumption and asthma, before he had reached his 33d year. He was interred in the cathedral of that city with an inscription over his grave; and had a monument erected to his memory in Westminster-abbey by Sir Simon Harcourt, afterwards lord-chancellor, with an epitaph upon it written by Dr Atterbury, though commonly ascribed to Dr Freind. He was one of those few poets whose muse and manners were equally excellent and amiable; and both were so in a very eminent degree.

Dr Johnson observes, that "Philips has been always praised, without contradiction, as a man modest, blameless, and pious; who bore a narrow fortune without discontent, and tedious and painful maladies without impatience; beloved by those that knew him, but not ambitious to be known. He was probably not formed for a wide circle. His conversation is commended for its innocent gaiety, which seems to have flowed only among his intimates; for I have been told, that he was in company silent and barren, and employed only upon the pleasures of his pipe. His addiction to tobacco is mentioned by one of his biographers, who remarks, that in all his writings except *Blenheim* he has found an opportunity of celebrating the fragrant fume. In common life, he was probably one of those who please by not offending, and whose person was loved, because his writings were admired. He died honoured and lamented, before any part of his reputation had withered, and before his patron St John had disgraced him. His works are few. The *Splendid Shilling* has the uncommon merit of an original design, unless it may be thought precluded by the ancient *Centos*. To degrade the sounding words and stately construction of Milton, by an application to the lowest and most trivial things, gratifies the mind with a momentary triumph over that grandeur which hitherto held its captives in admiration; the words and things are presented with a new appearance, and novelty is always grateful where it gives no pain. But the merit of such performances begins and ends with the first author. He that should again adapt Milton's phrase to the gross incidents of common life, and even adapt it with more art, which would not be difficult, must yet expect but a small part of the praise which Philips has obtained; he can only hope to be considered as the repeater of a jest.

"There is a Latin ode written to his patron St John, in return for a present of wine and tobacco, which cannot be passed without notice. It is gay and elegant, and exhibits several artful accommodations of classic expressions to new purposes. It seems better turned than the odes of Hannes. To the poem on cyder, written in imitation of the Georgics, may be given this peculiar praise, that it is grounded in truth; that the precepts which it contains are exact and just; and that it is therefore at once a book of entertainment and of science. This I was told by Miller, the great

Philips.

Philips
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Philistines

great gardener and botanist, whose expression was, that 'there were many books written on the same subject in prose, which do not contain so much truth as that poem.' In the disposition of his matter, so as to intersperse precept, relating to the culture of trees, with sentiments more generally pleasing, and in easy and graceful transitions from one subject to another, he has very diligently imitated his master; but he unhappily pleased himself with blank verse, and supposed that the numbers of Milton, which impress the mind with veneration, combined as they are with subjects of inconceivable grandeur, could be sustained by images which at most can rise only to elegance. Contending angels may shake the regions of heaven in blank verse; but the flow of equal measures, and the embellishment of rhyme, must recommend to our attention the art of engrafting, and decide the merit of the redstreak and pearmain. What study could confer, Philips had obtained; but natural deficiency cannot be supplied. He seems not born to greatness and elevation. He is never lofty, nor does he often surprise with unexpected excellence: but perhaps to his last poem may be applied what Tully said of the work of Lucretius, that 'it is written with much art, though with few blazes of genius.'

It deserves to be remarked, that there were two poets of both the names of our author, and who flourished in his time. One of them was Milton's nephew, and wrote several things, particularly some memoirs of his uncle, and part of Virgil Travestied. The other was the author of two political farces, which were both printed in 1716; 1. The Earl of Marr married, with the Humours of Jocky the Highlander. 2. The Pretender's Flight; or a Mock Coronation, with the Humours of the facetious Harry St John.

PHILIPSBURG, is an imperial town of Germany, in the circle of the Upper Rhine. It is very strong, and looked upon as one of the bulwarks of the empire. It is seated in a morass, and fortified with seven bastions, and several advanced works. The town belongs to the bishop of Spire, but all the works and the fortifications to the empire. It has been several times taken and retaken, particularly by the French in 1734, when the duke of Berwick was killed at the siege; but it was rendered back the year following, in consequence of, the treaty of Vienna. It is seated on the river Rhine, over which there is a bridge seven miles south of Spire, 22 south-east of Worms, and 40 north-east of Strasburg. E. Long. 8. 33. N. Lat. 49. 12.

PHILISTÆA (anc. geog.), the country of the Philistines (Bible); which lay along the Mediterranean, from Joppa to the boundary of Egypt, and extending to inland places not far from the coast. *Palestini*, the people; *Palestina*, the country (Josephus): Afterwards applied to the whole of the Holy Land and its inhabitants. *Philistæi*, the people (Septuagint); *Philistini* (Vulgate); the *Caphtorim* and *Philistim*, originally from Egypt, and descendants of Cham (Moses). Expelled and destroyed the Hivites the ancient inhabitants, and occupied their country; that is, the region which retained the name of *Philistim*, in which that of *Caphtorim* was swallowed up.

PHILISTINES, were the ancient inhabitants of Palestine, well known in sacred history. These people are sometimes called in Scripture *Cherethites* and *Caphtorims*.

The earlier part of their history is, like that of most other nations, very obscure and uncertain. The authors of the Universal History tell us, that they were descended from the *Caphtorim* partly, and partly from the *Caphtorim*, both from the loins of Mizraim the son of Ham, the son of Noah. Moses tells us (Deut. xi. 23.), that they drove out the *Avim* or *Avites* even to Azzah or Gazah, where they settled; but when this happened cannot be determined. On the whole, however, our learned authors are clearly of opinion, that the *Caphtorim* and *Caphtorim*, from whom the Philistines are descended, came originally from Egypt, and called the country which they had conquered by their own name (See PALESTINE). Many interpreters, however, think, that *Caphtor* was but another name for Cappadocia, which they imagine to have been the original country of the Philistines. But Father Calmet, in a particular dissertation prefixed to the first book of Samuel, endeavours to show that they were originally of the isle of Crete. The reasons which led him to think that *Caphtor* is the isle of Crete are as follow: The Philistines were strangers in Palestine, as appears in various parts of Scripture; such as Gen. x. 14. Deut. ii. 23. Jer. xlvii. 4. and Amos ix. 7. whence the Septuagint always translate this name *Strangers*. Their proper name was *Cherethims*, for Ezekiel (xxv. 16.), speaking against the Philistines, has these words, "I will stretch out mine hand upon the Philistines, and I will cut off the *Cherethims*, and destroy the remnant of the sea-coast." Zephaniah (ii. 5.), inveighing against the same people, says, "Wo unto the inhabitants of the sea-coasts, the nation of the *Cherethites*." And Samuel (Book I. xxx. 14.) says, that the *Amalekites* made an irruption into the country of the *Cherethites*, that is to say, of the Philistines, as the sequel of the discourse proves. And afterwards the kings of Judah had foreign guards called the *Cherethites* and *Pelethites*, who were of the number of the Philistines (2 Sam. xv. 18.) The Septuagint, under the name *Cherethites*, understood the *Cretans*; and by *Cherith* they understood *Crete*. Besides the Scripture says, that the Philistines came from the isle of *Caphtor*. Now we see no island in the Mediterranean wherein the marks whereby the Scripture describes *Caphtor* and *Cherethim* agree better than in the isle of Crete. The name *Cretim* or *Cherethim* is the same with that of *Cretenses*. The *Cretans* are one of the most ancient and celebrated people which inhabited the islands of the Mediterranean. They pretended to have been produced originally out of their own soil. This island was well peopled in the time of the Trojan war. Homer calls it the island with a hundred cities. The city of Gaza in Palestine went by the name of *Minoa* (*Steph. Bizant. in Gaza*), because Minos king of Crete coming into that country, called this ancient city by his own name.

Herodotus acknowledges that the *Cretans* were originally all barbarians, and did not come from Greece. Homer says, that a different language was spoken in the isle of Crete; that there were Greeks there, true or ancient *Cretans*, *Pelasgians*, &c. The ancient *Cretans* are the same as the *Cherethites*, the *Pelasgians* as the Philistines or *Pelethites* of the Scripture: their language was the same with that of the *Canaanites* or *Phœnicians*, that is, Hebrew: they were descended, as well

Philistines. well as Canaan, from Ham, by Mizraim (Gen. x. 6, 13, 14.) The manners, arms, religion, and gods of the Cretans and Philistines were the same. The arms of the one and the other were bows and arrows. Dagon the god of the Philistines was the same as the Dictynna of the Cretans.

Whether these arguments are convincing, it is not for us to determine; but Wells does not think they are, as he is of the same opinion with the authors of the Universal History, who say, that *Coptus*, the name of an old city of Egypt, is a corruption of the ancient *Caph-tor*. It is not, however, of great importance to determine whether they came from Crete, from Cappadocia, or from Egypt: they had certainly been a considerable time in the land of Canaan, when Abraham arrived there in the year of the world 2083. They were then a very powerful people, were governed by kings, and in possession of several considerable cities. The race of kings then in power were honoured with the title of *Abimelech*. This race, however, was but of short duration; for their monarchy became an aristocracy of five lords, who were, as far as we can discover, partly independent of each other, though they acted in concert for the common cause. This form of government was again succeeded by another race of kings, distinguished by the title of *Achish*, though they also bore that of *Abimelech*. The kings were always under great limitations. The Philistines appear to have been a very warlike people, industrious, and lovers of freedom; they did not circumcise, and in the early periods of their history held adultery in the greatest abhorrence. "Their character (say the authors of the Universal History) must be considered at different periods; for we may say they were not always the same people. In the days of Abraham and Isaac, they were without all doubt a righteous and hospitable nation: but afterwards a revolution in government, religion, and morals, may have ensued. From thenceforward they became like other idolatrous nations; the same enormities crept in and prevailed among them. They are constantly mentioned in Scripture as strangers; and, though possessed of a most considerable part of the Land of Promise, yet God would never suffer them to be driven out, they being Egyptians by descent, and not original natives, whose land only was promised to Abraham and his seed. Their arrogance and ambition were great; and so irreconcilable was their enmity (A) to the Israelites, that one would be almost tempted to think they were created on purpose to be a thorn in their sides; for though the hand of God was evidently against them several times, and particularly when they detained the ark, yet they hardened their hearts, and closed their eyes against conviction. They seem to have entertained a very fond veneration for their deities, in which they persisted, tho'

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they were eye-witnesses of the shame and ignominy which befel them in the presence of the captive ark; nay, they were so biassed in their favour, as to imagine that their gods might prevail against Him who had in so glaring a manner put them to shame and disgrace. They were much addicted to trade; which, considering their situation, they may have exercised from the beginning; but, by the accession of the fugitive Edomites in David's time, they rose to so great a reputation as merchants, that the Greeks, it seems, preferred them to all other nations in that respect, and from them called all the country bordering on theirs *Palestine*. Their language was not so different from that spoken by the Hebrews as to cause any difficulty for them to converse together, as will be perceived by their intercourse with Abraham and Isaac; so that, in all this region, the several nations spoke one and the same tongue, perhaps with some variation of dialect. They had doubtless the arts and sciences in common with the most learned and ingenious among their contemporaries, and perhaps some of them in greater perfection. They had giants among them; but whether they were originally of the breed of the Anakims, who retired hither when they were expelled from Hebron, or were sprung from accidental births, is not easily determined. We must not forget, that the invention of the bow and arrow is ascribed to this people.

"Their religion was different at different times; under their first race of kings, they used the same rites with the Hebrews. Abimelech, in the sin he had like to have committed with Sarah, through Abraham's timidity, was favoured with a divine admonition from God; and, by his speech and behaviour at that time, it seems as if he had been used to converse with the Deity. In after-times, they erred into endless superstitions, and different kinds of idolatry; each of the principal or five cities seemed to have had an idol of its own. Marna, Marnas, or Marnash, was worshipped at Gaza, and is said to have migrated into Crete, and to have become the Cretan Jupiter. Dagon was worshipped at Azotus; he seems to have been the greatest, the most ancient, and most favourite god they had; to which may be added, that he perhaps subsisted the longest of any that did not straggle out of the country. To him they ascribed the invention of bread-corn, or of agriculture, as his name imports. We cannot enter into the common notion of his being represented as a monster, half man half fish; nor consequently into another almost as common, that he is the same with the Syrian goddess Derceto, who, we are told, was represented under some such mixed form. Our opinion is, that this idol was in shape wholly like a man; for we read of his head, his hands, and his feet. He stood in a temple at Azotus, and had priests of his own who paid him a very constant attendance.

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(A) "From a passage in Chronicles, it is guessed to have been of very ancient date; where it is said, that 'the men of Gath slew the children of Ephraim, who would have taken their cattle from them.' This incident is nowhere else to be found; and there are various notions concerning the sense in which we must take this passage. As to the time of the transaction, most people allow it to have been while the children of Israel were sojourners in Egypt. It plainly appears, by the next verse, that Ephraim himself was living at that period. The Targum supposes his children miscomputed the time they were to serve in Egypt, and began too early an attempt upon their Promised Land."

Philistines

Next to Dagon was Baalzebub the God of Ekron. In the text of the New Testament he is called *Beelzebub*, and the *prince of devils*. His name is rendered *lord of flies*; which by some is held to be a mock appellation bestowed on him by the Jews; but others think him so styled by his worshippers, as Hercules Apomyios, and others, were, from his driving those insects away; and urge, that Ahaziah, in his sickness, would scarcely have applied to him, if his name had carried in it any reproach. But it must be remembered, it is the sacred historian that makes use of that contemptuous term in derision; whereas the idolatrous monarch, who was one of his votaries, might call him by his common name, supposed to have been *Baal-zebooth*, 'the lord of armies,' or *Baal-shamim*, 'lord of heaven,' or some other bordering on Baal-zebub. How, or under what form he was represented, is uncertain: some place him on a throne, and attire him like a king; others paint him as a fly. Not to dwell on this obscurity, it appears that he became an oracle of the highest repute for omniscience and veracity; that he had priests of his own; and that he, in the middle times at least, was much sought after by those who were anxious about futurity. Derceto we take certainly to have been the goddess of Ascalon; but we are supported by profane authority, without the least countenance from Scripture. Gath is seemingly the only city of all the five unprovided with a deity; wherefore, as the Scripture declares, that Ashtaroath, or Astarte, was worshipped by this people, we are ready to place her at Gath, and the rather, as this of all their cities may have had most communication with Sidon. To speak in general concerning their religious rites and ceremonies, which is all we can do, they seem to have erected very large and spacious temples, or very wide halls, for the celebration of their solemn seasons and festivals (for such they surely had); their religious offices were attended with much pomp, and a great concourse from all parts; and they presented their gods with the chief part of their spoil, and carried them about with them when they went to war. We do not find in Scripture that they sacrificed their children; and yet the Curetes^(a) are said to be their descendants."

With respect to the history of this extraordinary people, we find from the above extract, that they were not comprehended in the number of nations devoted to extermination, and whose territory the Lord had abandoned to the Hebrews; nor were they of the cursed seed of Canaan. However, Joshua did not forbear to give their lands to the Hebrews, and to set upon them by command from the Lord, because they possessed a country which was promised to the people of God (Josh. xv. 45—47. and xiii. 2, 3.) But these conquests of Joshua must have been ill maintained, since under the Judges, under Saul, and at the beginning of the reign of David, the Philistines oppressed the Israelites. True it is, Shamgar, Samson, Samuel, and Saul, made head against them,

but did not reduce their power; and they continued independent down to the reign of David, who subjected them to his government.

They continued in subjection to the kings of Judah down to the reign of Jehoram, son of Jehoshaphat; that is, for about 246 years. However, Jehoram made war against them, and probably reduced them to his obedience again; because it is observed in Scripture, that they revolted again from Uzziah; and that this prince kept them to their duty during the time of his reign (2 Chr. xxi. 16. and xxvi. 6, 7.) During the unfortunate reign of Ahaz, the Philistines made great havoc in the territories of Judah; but his son and successor Hezekiah subdued them (2 Chr. xxviii. 18. and 2 Kings xviii. 8.) Lastly, they regained their full liberty under the latter kings of Judah; and we may see by the menaces denounced against them by the prophets Isaiah, Amos, Zephaniah, Jeremiah, and Ezekiel, that they brought a thousand hardships and calamities upon the children of Israel: for which cruelties God threatened to punish them. Eshdod or Azoth, and took it (Isa. xx. 1.) And according to Herodotus, Psammeticus king of Egypt took the same city, after a siege of 29 years. There is great probability, that Nebuchadnezzar, when he subdued the Ammonites, Moabites, Egyptians, and other nations, bordering upon the Jews, reduced also the Philistines. After this, they fell under the dominion of the Persians; then under that of Alexander the Great, who destroyed the city of Gaza, the only city of Phœnicia that durst oppose him. After the persecution of Antiochus Epiphanes, the Asmonæans subjected under their obedience several cities of the Philistines; and Tryphon gave to Jonathan Maccabæus the government of the whole coast of the Mediterranean, from Tyre as far as Egypt, which included all the country of the Philistines.

PHILLYREA, MOCK-PRIVET; a genus of the monogynia order, belonging to the diandria class of plants. Each flower contains two males and one female. Some say there are seven species, all of them shrubby plants, and natives of France or Italy. Others reckon only three species, which are as follow:

1. *Phillyrea media*; the oval-leaved phillyrea or mock-privet, or the medial leaved phillyrea, a tall evergreen shrub, native of the south of Europe.
2. *Phillyrea latifolia*; the broad-leaved phillyrea or mock-privet, a tall evergreen shrub, native of the south of Europe.
3. *Phillyrea angustifolia*; the narrow-leaved phillyrea or mock-privet, a deciduous shrub, native of Spain and Italy.

1. The first has three varieties, viz. The first is the common smooth-leaved phillyrea. This plant grows to be 12 or 14 feet high, and the branches are very numerous. The older branches are covered with a dark brown bark, but the bark on the young shoots is of a fine green colour. They are oval, spear-shaped, and grow opposite, by pairs, on strong short footstalks.

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(a) "The Curetes sacrificed their children to Saturn; and from the similitude this name bears to Cherethites or Philistines, it has been advanced that they are the same people; but as we have no warrant for saying the Philistines practised so barbarous and unnatural a custom, we may venture to pronounce, that they learned it not from them, but borrowed it elsewhere."

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ing and Gar-
dening.

Phillyrea. The flowers are produced in clusters from the wings of the young branches. They are small, and of a kind of greenish-white colour; they appear in March, and are succeeded by berries, which are first green, then red, and black in the autumn when ripe. The second variety is the privet-leaved phillyrea, which grows to be 10 or 12 feet high, and the branches of which are covered with a brown bark. The leaves a little resemble the privet; they are of a fine green colour, and grow by pairs on the branches. They are of a lanceolate figure, and their edges are entire, or nearly so; for some signs of serratures sometimes appear. The flowers grow like others in clusters in March. They are whitish, and are succeeded by small black berries. The third variety, or the olive-leaved phillyrea, is the most beautiful of all the sorts. It will grow to be about 10 or 12 feet high; and the branches, which are not numerous, spread abroad in a free easy manner, which may not improperly be said to give the tree a fine air. They are long and slender, and are covered with a light-brown bark; and on these the leaves stand opposite by pairs at proper intervals on short footstalks. They resemble those of the olive-tree, and are of so delightful a green as to force esteem. Their surface is exceeding smooth, their edges are entire, and the membrane of a thickish consistence. The flowers are small and white, and like the other sorts make no show. They are succeeded by single roundish berries.

2. The broad-leaved phillyrea will grow to be about 12 feet high. The branches seem to be produced stronger and more upright than those of the former species. The bark is of a grey colour, spotted with white, which has a pretty effect; and the leaves grow opposite by pairs. They are of a heart-shaped oval figure, of a thick consistence, and a strong dark-green colour. Their edges are sharply serrated, and they stand on short strong footstalks. The flowers grow from the wings of the leaves in clusters in March. They are of a kind of greenish-white colour, make no show, and are succeeded by small round black berries. There are also three varieties of this species, viz. the ilex-leaved phillyrea, the prickly phillyrea, and the olive phillyrea with slightly serrated edges.

3. The narrow-leaved phillyrea is of lower growth, seldom rising higher than 8 or 10 feet. The branches are few and slender, and they also are beautifully spotted with grey spots. The leaves, like the others, stand opposite by pairs. They are long and narrow, spear-shaped, and undivided, of a deep green colour, and of a thick consistence. Their edges are entire, and they also stand on short footstalks. The flowers, like the others, make no show. They are whitish, and grow in clusters from the wings of the branches, in March; and are succeeded by small round black berries. The varieties of this species are, the rosemary phillyrea, lavender phillyrea, striped phillyrea, &c.

This vegetable is to be propagated by seeds or layers. 1. By seeds. These ripen in the autumn, and should be sown soon after. The mould must be made fine; and if it is not naturally sandy, if some drift sand be added, it will be so much the better. The seeds for the most part remain until the second spring before they come up; and if they are not sown soon after they are ripe, some will come up even the third spring after. They must be sown about an inch deep; and

during the following summer should be kept clean from weeds. After they are come up, the same care must be observed, and also watering in dry weather; and if the beds are hooped, and the plants shaded in the hottest season, they will be so much the better for it. However, at the approach of winter they must be hooped, and the beds covered with mats in the hardest frosts, otherwise there will be danger of losing the whole crop; for these trees, though they are very hardy when grown tolerably large, are rather tender whilst seedlings. It will be proper to let them remain in the seed-beds with this management for two summers; and then waiting for the first autumnal rains, whether in September or October (and having prepared a spot of ground), they should at that juncture be planted out, and this will occasion them immediately to strike root. The distance they should be planted from each other need not be more than a foot, if they are not designed to remain long in the nursery. If there is a probability of their not being wanted for some years, they should be allowed near double that distance; and every winter the ground in the rows should be well dug, to break their roots, and cause them to put out fresh fibres, otherwise they will be in danger of being lost when brought into the shrubbery quarters. 2. By layers they will easily grow. The autumn is the best time for this operation, and the young shoots are fit for the purpose. The best way of layering them is by making a slit at the joint; though they will often grow well by a twist being only made. When the gardener chooses the method of twisting a young branch for the layers, he must be careful to twist it about a joint so as only to break the bark; for if it is too much twisted, it will die from that time, and his expectations wholly vanish. But if it be gently twisted with art and care, it will at the twisted parts be preparing to strike root, and by the autumn following, as well as those layers that had been slit, will have good roots; the strongest of which will be fit for planting where they are wanted to remain, whilst the weaker and worst-rooted layers may be planted in the nursery-ground like the seedlings, and treated accordingly.

PHILO, an ancient Greek writer, was of a noble family among the Jews, and flourished at Alexandria during the reign of Caligula. He was the chief of an embassy sent to Rome about the year 42, to plead the cause of the Jews against Apion, who was sent by the Alexandrians to charge them with neglecting the honours due to Cæsar. Caligula, however, would not allow him to speak, and behaved to him in such a manner that Philo was in considerable danger of losing his life. Others again tell us that he was heard; but that his demands were refused. He afterwards went to Rome in the reign of Claudius; and then, Eusebius and Jerome inform us, he became acquainted with St Peter, with whom he was on terms of friendship. Photius adds, that he became a Christian, and afterwards, from some motive of resentment, renounced it. Great part of this, however, is uncertain, for few believe that St Peter was at Rome so early as the reign of Claudius, if he ever was there at all.

Philo was educated at Alexandria, and made very great progress in eloquence and philosophy. After the fashion of the time, he cultivated, like many of his nation and faith, the philosophy of Plato, whose prin-

Philo,
Philocles.

ciples he so thoroughly imbibed, and whose manner he so well imitated, that it became a common saying, "Aut Plato philonizat, aut Philo platonizat." Josephus says, he was a man "eminent on all accounts:" and Eusebius describes him, "copious in speech, rich in sentiments, and sublime in the knowledge of holy writ." He was, however, so much immersed in philosophy, particularly the Platonic, that he neglected the Hebrew language, and the rites and customs of his own people. Scaliger says, that Philo "knew no more of Hebrew and Syriac than a Gaul or a Scythian." Grotius is of opinion, that "he is not fully to be depended on, in what relates to the manners of the Hebrews:" and Cudworth goes further; for "though a Jew by nation (says he), he was yet very ignorant of Jewish customs." Fabricius thinks differently; for though he allows some inadvertencies and errors of Philo with regard to these matters, yet he does not see a sufficient foundation on which to charge so illustrious a doctor of the law with ignorance. He allows, however, that Philo's passion for philosophy had made him more than half a Pagan; for it led him to interpret the whole law and the prophets upon Platonic ideas; and to admit nothing as truly interpreted which was not agreeable to the principles of the academy. Besides, this led him farther; he turned every thing into allegory, and deduced the darkest meanings from the plainest words. This most pernicious practice ORIGEN, it is known, imitated, and exposed himself by it to the scoffs of Celsus and of Porphyry. Philo's writings abound with high and mystical, new and subtle, far-fetched and abstracted, notions; and indeed the doctrines of Plato and Moses are so promiscuously blended, that it is not an easy matter to assign to each his principles. There are certainly, however, in his works many excellent things. Though he is continually Platonising and allegorising the Scriptures, he abounds with fine sentiments and lessons of morality; and his morals are rather the morals of a Christian than of a Jew. History, together with his own writings, give us every reason to believe that he was a man of great prudence, constancy, and virtue.

His works were first published in Greek by Turnebus at Paris 1552. A Latin translation made by Gelenius was afterwards added, and printed several times with it. The Paris edition of 1640 in folio was the best for a whole century; which made Cotelierius say, that "Philo was an author that deserved to have a better text and a better version." In 1742, a handsome edition of his work was published at London by Dr Mangey in two volumes folio; which is certainly preferable if it were only for the paper and print, but it is not so good a one as Philo deserves.

Many of our readers may be desirous of further details respecting this celebrated man; we refer such therefore to Josephus's *Antiquities*, Eusebius's *Ecclesiastical History*, St Jerome's work *De Scriptoribus Ecclesiasticis*, Fabricius *Bibl. Græc. Cave Hist. Liter.* and Vol. II. of *Monuments of the Greek Church*.

PHILOCLEES, an admiral of the Athenian fleet during the Peloponnesian war. He recommended to his countrymen to cut off the right hand of such of

the enemies as were taken, that they might be rendered unfit for service. His plan was adopted by all the ten admirals except one; but their expectations were frustrated, and instead of being conquerors they were totally defeated at Ægospotamos by Lyfander, and Philocles was put to death with the rest of his colleagues.

PHILOCTETES, in fabulous history, the son of Pæan, was the faithful companion of Hercules; who at his death obliged him to swear not to discover the place where his ashes were interred, and presented him with his arrows dipped in the Hydra's blood. The Greeks at the siege of Troy being informed by an oracle that they could never take that city without those fatal arrows, went to Philoctetes, and insisted upon his discovering where he had left his friend; when Philoctetes, to evade the guilt of perjury, let them know where Hercules was intombed, by stamping upon the place: but he was punished for the violation of his oath, by dropping an arrow upon that foot; which, after giving him great agony, was at length cured by Macaon. He was afterwards taken by Ulysses to the siege of Troy, where he killed Paris with one of his arrows.

PHILOLAUS, of Crotona, was a celebrated philosopher of antiquity, of the school of Pythagoras, to whom that philosopher's *Golden Verses* have been ascribed. He made the heavens his principal object of contemplation; and has been idly (A) supposed to have been the author of that true system of the world which Copernicus afterwards revived. This made Bullialdus place the name of Philolaus at the head of two works, written to illustrate and confirm that system.

"He was (says Dr Enfield) a disciple of Archytas, *Hist. of Philosophy* and flourished in the time of Plato. It was from him that Plato purchased the written records of the Pythagorean system, contrary to an express oath taken by the society of Pythagoreans, pledging themselves to keep secret the mysteries of their sect. It is probable, that among these books were the writings of Timæus, upon which Plato formed the dialogue which bore his name. Plutarch relates, that Philolaus was one of the persons who escaped from the house which was burned by Cylon, during the life of Pythagoras; but this account cannot be correct. Philolaus was contemporary with Plato, and therefore certainly not with Pythagoras. Interfering in affairs of state, he fell a sacrifice to political jealousy.

"Philolaus treated the doctrine of nature with great subtlety, but at the same time with great obscurity; referring every thing that exists to mathematical principles. He taught, that reason, improved by mathematical learning, is alone capable of judging concerning the nature of things; that the whole world consists of infinite and finite; that number subsists by itself, and is the chain which by its power sustains the eternal frame of things; that the Monad is not the sole principle of all things, but that the Binary is necessary to furnish materials from which all subsequent numbers may be produced; that the world is one whole, which has a fiery centre, about which the ten celestial spheres revolve, heaven, the sun, the planets, the

(A) We say idly, because there is undoubted evidence that Pythagoras learned that system in Egypt. See PHILOSOPHY.

Philoc-
tetes,
Philolaus.

Philolaus. the earth, and the moon; that the sun has a vitreous surface, whence the fire diffused through the world is reflected, rendering the mirror from which it is reflected visible; that all things are preserved in harmony by the law of necessity; and that the world is liable to destruction both by fire and by water. From this

summary of the doctrine of Philolaus it appears probable, that, following Timæus, whose writings he possessed, he so far departed from the Pythagorean system as to conceive two independent principles in nature, God and Matter, and that it was from the same source that Plato derived his doctrine upon this subject."

Philolaus.

P H I L O L O G Y.

¹
Definition.

PHILOLOGY is compounded of the two Greek words *φίλος* and *λογος*, and imports "the desire of investigating the properties and affections of words." The sages of Greece were, in the most ancient times, denominated *σοφοί*, that is, *wise men*. Pythagoras renounced this pompous appellation, and assumed the more humble title of *φιλοσοφος*, that is, *a lover of wise men*. The learned Greeks were afterwards called *philosophers*; and in process of time, in imitation of this epithet, the word *philologer* was adopted, to import "a man deeply versed in languages, etymology, antiquities, &c." Hence the term *philology*, which denotes the science that we propose briefly to discuss in the following article.

Though philology, in its original import, denoted only the study of words and language, it gradually acquired a much more extensive, and at the same time a much more useful, as well as more exalted, signification.

²
Objects and uses of philology.

It comprehended the study of grammar, criticism, etymology, the interpretation of ancient authors, antiquities; and, in a word, every thing relating to ancient manners, laws, religion, government, language, &c. In this enlarged sense of the word, philology becomes a science of the greatest utility; opens a wide field of intellectual investigation; and indeed calls for a more intense exertion of industry, and multifarious erudition, than most of those departments of literature which custom hath dignified with more high-sounding names. It is indeed apparent, that, without the aid of philological studies, it is impossible, upon many occasions, to develop the origin of nations; to trace their primary frame and constitution; to discover their manners, customs, laws, religion, government, language, progress in arts and arms; or to learn by what men and what measures the most celebrated states of antiquity rose into grandeur and consideration. The study of history, so eminently useful to the legislator, the divine, the military man, the lawyer, the philosopher, and the private gentleman who wishes to employ his learned leisure in a manner honourable and improving to himself, and useful to his country, will contribute very little towards enlightening the mind without the aid of philological researches. For these reasons we shall endeavour to explain the various branches of that useful science as fully and as intelligibly as the nature of the present undertaking will permit.

³
Object of this article.

Most of the branches of philology have been already canvassed under the various heads of **CRITICISM**, **ETYMOLOGY**, **GRAMMAR**, **LANGUAGE**, &c. There still remains one part, which has been either slightly touched upon, or totally omitted, under the foregoing topics: we mean, the nature and complexion of most of the oriental tongues; as also some of the radical dialects of the languages of the west. As we would willingly

gratify our readers of every description to the utmost of our power, we shall endeavour in this place to communicate to them as much information upon that subject as the extent of our reading, and the limits prescribed one single article, will permit.

Before we enter upon this subject, we must observe, that it is not our intention to fill our pages with a tedious, uninteresting, catalogue of barbarous languages, spoken by savage and inconsiderable tribes, of which little, or perhaps nothing, more is known than barely their names. Such an enumeration would swell the article without communicating one single new idea to the reader's antecedent stock. We shall therefore confine our inquiries to such languages as have been used by considerable states and societies, and which of consequence have acquired a high degree of celebrity in the regions of the east.

What was the antediluvian language, or whether it was divided into a variety of dialects as at this day, can only be determined by the rules of analogy; and these will lead us to believe, that whatever might have been the primitive language of mankind, if human nature was then constituted as it is at present, a great variety of dialects must of necessity have sprung up in the space of near 2000 years. If we adopt the Mosaic account of the antediluvian events, we must admit that the descendants of Cain for some ages lived separated from those of Seth. Their manner of life, their religious ceremonies, their laws, their form of government, were probably different, and these circumstances would of course produce a variety in their language. The posterity of Cain were an inventive race. They found out the art of metallurgy, music, and some think of weaving; and in all probability many other articles conducive to the ease and accommodation of life were the produce of their ingenuity. A people of this character must have paid no small regard to their words and modes of expression. Wherever music is cultivated, language will naturally be improved and refined. When new inventions are introduced, a new race of words and phrases of necessity spring up, corresponding to the recent stock of ideas to be intimated. Besides, among an inventive race of people, new vocables would be continually fabricated, in order to supply the deficiencies of the primitive language, which was probably scanty in words, and its phraseology unpolished. The Cainites, then, among their other improvements, cannot well be supposed to have neglected the cultivation of language.

Many conjectures have been hazarded both by ancient and modern authors with respect to the origin of writing; an art nearly connected with that of speaking. According to Pliny*, "the Assyrian letters had always existed; some imagined that letters had been invented

⁴
Variety of dialects before the deluge.

⁵
Where, especially among the children of Cain.

* Not. hist. lib. vii. cap. 56.

History of
6
Origin of
writing.

vented by the Egyptian Mercury; others ascribed the honour of the invention to the Syrians." The truth seems to be, that letters were an antediluvian invention, preserved among the Chaldeans or Assyrians, who were the immediate descendants of Noah, and inhabited those very regions in the neighbourhood of which the ark rested, and where that patriarch afterwards fixed his residence. This circumstance, we think, affords a strong presumption that the use of letters was known before the deluge, and transmitted to the Assyrians and Chaldeans by Noah their progenitor, or at least by their immediate ancestors of his family. If, then, the art of writing was an antediluvian invention, we think that in all probability it originated among the posterity of Cain.

The descendants of Seth, according to the oriental tradition, were chiefly addicted to agriculture and tending of cattle. They devoted a great part of their time to the exercises of piety and devotion. From this circumstance they came to be distinguished by the title of the (A) *sons of God*. According to this description, the Sethites were a simple (B), unimproved race of people till they mingled with the race of Cain; after which period they at once adopted the improvements and the vices of that wicked family.

It is not, however, probable, that all the descendants of Seth, without exception, mingled with the Cainites. That family of which Noah was descended had not incorporated with the race of Cain: it was, according to the sacred historian, lineally descended from Seth, and had preserved the worship of the true God, when, it is probable, the greatest part of mankind had apostatised and become idolaters (C). Along with the true religion, the progenitors of Noah had preserved that simplicity of manners and equability of character which had distinguished their remote ancestors. Agriculture and rearing cattle had been their favourite occupations. Accordingly we find, that the patriarch Noah, immediately "after the deluge," became a husbandman, and "planted a vineyard." The chosen patriarchs, who doubtless imitated their pious ancestors, were shepherds, and employed in rearing and tending cattle. Indeed there are strong presumptions that the Chaldeans, Assyrians, Syrians, Canaanites, and Arabians, in the earliest ages followed the same profession.

From this deduction, we imagine it is at least probable, that the ancestors of Noah persisted in the observance of the same simplicity of manners which had

been handed down from Adam to Seth, and from him to Enoch, Methuselah, Lamech, and from this last to Noah. According both to scripture and tradition, innovations were the province of the Cainites, while the descendants of Seth adhered to the primitive and truly patriarchal institutions.

If these premises are allowed the merit of probability, we may justly infer that the language of Noah, whatever it was, differed very little from that of Adam (D); and that if it is possible to ascertain the language of the former, that of the latter will of course be discovered. We shall then proceed to throw together a few observations relating to the language of Noah, and leave our readers to judge for themselves. We believe it will be superfluous to suggest, that our intention in the course of this deduction, is, if possible, to trace the origin and antiquity of the Hebrew tongue; and to try to discover whether that language, or any of its sister dialects, may claim the honour of being the original language of mankind.

Whatever may have been the dialect of Noah and his family, that same dialect, according to the Mosaic account, must have obtained, without any alteration, till the era of the building of the tower of Babel.—Upon this occasion a dreadful convulsion took place: the language of mankind was confounded, and men were scattered abroad upon the face of all the earth.

How far this catastrophe (E) extended, is not the business of the present inquiry to determine. One thing is certain beyond all controversy, namely, that the languages of all the nations which settled near the centre of population were but slightly affected by its influence. A very judicious writer has observed *, that 3000 years after, the inhabitants of those countries exhibited a very strong resemblance of cognation, "in their language, manner of living, and the lineaments of their bodies. At the same time he observes, that the resemblance in all those particulars was most remarkable among the inhabitants of Mesopotamia." This observation, with respect to language, will, we doubt not, be vouched by every one of our readers who has acquired even a superficial knowledge of the languages current in those quarters, at a very early period.

It appears, then, that the languages of the Armenians, Syrians, Assyrians, Arabians, and probably of the Chanaanites, did not suffer materially by the confusion of tongues. This observation may, we imagine, be extended to many of the dialects (F) spoken by the people who settled in those countries not far distant

(A) From this passage (Gen. ch. vi. ver. 2.) misunderstood, originated the absurd idea of the connection between angels and mortal women. See *Joseph. Antiq. Jud.* l. i. cap. 4. See *Euseb. Chron.* lib. i. All the fathers of the church, almost without exception, adopted this foolish notion. See also *Philo. Jud.* p. 198. ed. Turn, Paris 1552.

(B) The orientals, however, affirm that Seth, whom they call *Edris*, was the inventor of astronomy.

(C) We think it highly probable that idolatry was established before the flood; because it prevailed almost immediately after that catastrophe. See *POLYTHEISM*.

(D) For the first language communicated to Adam, see the article on *LANGUAGE*; also *Shenckford's Connect.* Vol. I. l. ii. p. 111. et seq.

(E) Josephus and the fathers of the church tell us, that the number of languages produced by the confusion of tongues was 72; but this is a mere rabbinical legend.

(F) The languages of the Medes, Persians, Phœnicians, and Egyptians, very much resembled each other in their original complexion; and all had a strong affinity to the Hebrew, Chaldean, Syriac, &c. See *Walton's Proleg.*

History of ⁹ ~~that~~ from the region where the sacred historian has fixed the original seat of mankind after the deluge. The inference then is, that if Noah and his family spoke the original language of Adam, as they most probably did, the judgment which affected the confusion of tongues did not produce any considerable alteration in the language of such of the descendants of Noah as settled near the region where that patriarch had fixed his residence after he quitted the ark.

Only a part of mankind engaged in building the tower,

But supposing the changes of language produced by the catastrophe at the building of the tower as considerable as has ever been imagined, it does not, after all, appear certain that all mankind without exception were engaged in this impious project. If this assertion should be well founded, the consequence will be, that there was a chosen race who did not engage in that enterprise. If there was such a family, society, or body of men, it will follow, that this family, society, &c. retained the language of its great ancestor without change or variation. That such a family did actually exist, is highly probable, for the following reasons:

1. Gen. 11. 25.

1. We think there is reason to believe, that Ham, upon the heavy curse denounced upon him by his father $\ddagger$, retired from his brethren, and fixed his residence elsewhere. Accordingly, we find his descendants scattered far and wide, at a very great distance from the Gordyean mountains, where the ark is generally supposed to have rested immediately after the flood. Some of them we find in Chaldea, others in Arabia Felix, others in Ethiopia (g), others in Canaan, and others in Egypt; and, finally, multitudes scattered over all the coast of Africa. Between those countries were planted many colonies of Shemites, in Elam, Assyria, Syria, Arabia, &c. We find, at the same time, the descendants of Shem and Japheth settled, in a great degree, contiguous to each other. This dispersion of the Hamites, irregular as it is, can scarce, we think, have been accidental; it must have been owing to some uncommon cause, and none seems more probable than that assigned above. If, then, the descendants of Ham separated early, and took different routs, as from their posterior situations it appears they did, they could not all be present at the building of the tower.

10 and those not the descendants of Shem. Chap. x. verse 22.

2. It is not probable that the descendants of Shem were engaged in this undertaking, since we find that they were not scattered abroad upon the face of all the earth. The children of Shem were $\parallel$ Elam, Ashur, Arphaxad, Lud, and Aram. Elam settled near the mouth of the river Tigris, in the country which, by

Gentile writers, was called *Elymais*. Above him, on the same river, lay the demesne of Ashur on the western side. In like manner, upon the same river, above him was situated Aram, who possessed the country of Aramea; and opposite to him was Arphaxad, or Arbaces or Arbaches, and his country was denominated *Arphachitis*. Lud, as some think, settled in Lydia, among the sons of Japheth; but this opinion seems to be without foundation (h). Here, then, there is dispersion, but such as must have originated from the nature of the thing. The four, or rather the five, brothers, all settled contiguous, without being scattered abroad upon the face of the whole earth. Besides, there was no confusion of language among these tribes: they continued to use one and the same *lip* through many succeeding generations.

Language

From these circumstances, it appears that the posterity of Shem were not involved in the guilt of the builders of the tower, and of consequence did not undergo their punishment. If, then, the language of the Shemites was not confounded upon the erection of the tower, the presumption is, that they retained the language of Noah, which, in all probability, was that of Adam. Some dialectical differences would in process of time creep in, but the radical fabric of the language would remain unaltered.

11 The language of Adam preserved in the family of Shem.

3. The posterity of Shem appear in general to have cultivated the pastoral life. They imitated the style of living adopted by the antediluvian posterity of Seth. No sooner had Noah descended from the ark, than he became *Ishba Adamah*, a man of the earth; that is, a husbandman, and planted a vineyard. We find that some ages after, Laban the Syrian had flocks and herds; and that the chief wealth of the patriarch Abraham and his children consisted in their flocks and herds. Even his Gentile descendants, the Ishmaelites and Midianites, seem to have followed the same occupation. But people of this profession are seldom given to changes: their wants are few, and of consequence they are under few or no temptations to deviate from the beaten track. This circumstance renders it probable, that the language of Noah, the same with that of Adam, was preserved with little variation among the descendants of Arphaxad down to Abraham.

12 down to Abraham.

We have observed above, that Ham, upon the curse denounced against him by his father, very probably left the society of his other brothers, and emigrated elsewhere, as Cain had done in the antediluvian world. There is a tradition still current in the East, and which was adopted by many of the Christian fathers (1), that Noah, in the 930th year of his life, by divine appointment,

4.

Proleg.; Gale's *Court of the Gent.* vol. 1. l. 1. ch. 11. page 70. et seq.; Boch. *Phalec* and *Chanaan pass.* To these we may add the Greek language, as will appear more fully below.

(g) Josephus informs us, that all the nations of Asia called the Ethiopians *Cushim*, l. 1. cap. 7.

(h) The ancient name of Lydia was *Mæonia*. See Strabo *Casaub.* l. 13. page 586. chap. 7. *Rhod.* 577. The Lydians were celebrated for inventing games; on which account they were nicknamed by the Æolian Greeks *Λυδοί*, *Lydi* or *Ludi*, from the Hebrew words *lutz*, *ludere*, *illudere*, *deridere*. We find (Ezek. chap. xxvii. ver. 10.) the men of Elam and the men of Lud joined in the defence of Tyre; which seems to intimate, that the Elamites and Ludim were neighbours. If this was actually the case, then Lud settled in the same quarter with his brothers.

(1) *Epiph.* vol. i. pag. 5. *ibid.* pag. 709. where our learned readers will observe some palpable errors about *Rhinocorura*, &c. *Euseb. Chron.* pag. 10. *Syncellus*, pag. 89, *Cedrenus*, *Chron. Pasch.* &c.

History of ment, did, in the most formal manner, divide the whole terraqueous globe among his three sons, obliging them to take an oath that they would stand by the decision. Upon this happened a migration at the birth of Peleg, that is, about three centuries after the flood. It is affirmed, that Nimrod the arch-rebel disregarded this partition, and encroached upon the territory of Ashur, which occasioned the first war after the flood.

The Greeks had acquired some idea of this partition, which they supposed to have been between Jupiter †, Neptune, and Pluto. Plato seems to have heard of it (κ): "For (says he) the gods of old obtained the dominion of the whole earth, according to their different allotments. This was effected without any contention, for they took possession of their several provinces in a fair and amicable way, by lot."

Calymach.
Hym.
Hom. Iliad,
lib. xv.

§ Ant. Jud. Josephus, in his account of the dispersion of mankind, lib. i. c. 5. plainly insinuates a divine destination; and Philo Judeus (L) was of the same opinion before him.

In consequence of this arrangement, the sons of Shem possessed themselves of the countries mentioned in the preceding pages: the posterity of Japhet had spread themselves towards the north and west; but the Hamites, who had separated from their brethren in consequence of the curse, not choosing to retire to their quarters, which were indeed very distant from the place where the ark rested, seized upon the land of Canaan (M). Perhaps, too, it might be suggested by some malicious spirits, that the aged patriarch was dealing partially, when he assigned Ham and his posterity a quarter of the world to inhabit not only remote from the centre of population, but likewise sequestered from the rest of mankind (N).

Be that as it may, the children of Ham removed eastward, and at length descending from the Carduchean or Gordyzean mountains, directed their course westward, and arrived at the plains of Shinar, which had been possessed by the Ashurim ever since the era of the first migration at the birth of Peleg. The sacred historian informs us, that the whole earth "was of one language and of one speech;" that in journeying from the east, they lighted upon the plain of Shinar, and dwelt there. In this passage we find no particular people specified; but as we find Nimrod,

ne of the descendants of Ham, settled in that country, we are sure that they were the offspring of that patriarch. It would not, we think, be easy to assign a reason how one branch of the family of Ham came to plant itself in the midst of the sons of Shem by any other means but by violence.

It is indeed generally supposed, that Nimrod, at the head of a body of the children of Ham, made war upon Ashur, and drove him out of the country of Shinar; and there laid the foundation of that kingdom, the beginning of which was Babel: that this chief, supported by all the Cushites, and a great number of apostates from the family of Shem and Japhet who had joined him, refused to submit to the divine ordinance by the mouth of Noah, with respect to the partition of the earth; and that he and his adherents were the people who erected the celebrated tower, in consequence of a resolution which they had formed to keep together, without repairing to the quarters assigned them by the determination of Heaven. This was the crime which brought down the judgment of the Almighty upon them, by which they were scattered abroad upon the face of all the earth. The main body of the children of Shem and Japhet were not engaged in this impious undertaking; their language, therefore, was not confounded, nor were they themselves scattered abroad. Their habitations were contiguous; those of the Shemites towards the centre of Asia; the dwellings of Japhet were extended towards the north and north-west; and the languages of both these families continued for many ages without the least variation, except what time, climate, laws, religion, new inventions, arts, sciences, and commerce, &c. will produce in every tongue in a succession of years.

The general opinion then was, that none but the progeny of Ham and their associates were present at the building of the tower, and that they only suffered by the judgment (O) consequent upon that attempt. There are even among the Pagans some allusions to the division of the world among the three sons of Noah. Many of the learned have imagined that this patriarch was Saturn; and that his three sons were Jupiter, Neptune, and Pluto, as has been observed above.

Bero-

(κ) Critias, vol. 3. pag. 109. Serr. Apollodorus mentions a time when the gods respectively selected particular cities and regions, which they were to take under their peculiar protection.

(L) L. 10. p. 236. Turn. Paris 1552. We have a plain allusion to this distribution (Deut. ch. xxxii. ver. 7.) "When the most High divided to the nations their inheritance, when he separated the sons of Adam, he sets the bounds of the people, according to the number of the children of Israel; for the Lord's portion is his people; Jacob is the lot of his inheritance." From this passage it appears, that the whole was arranged by the appointment of God, and that the land of Canaan was expressly reserved for the children of Israel. St Paul, Acts ch. xvii. ver. 26. speaks of this divine arrangement, "God made of one blood all nations of men, for to dwell on all the face of the earth; and determined the bounds of their habitation."

(M) The ark, according to the most probable accounts, rested upon mount Ararat in Armenia.

(N) We think it is by no means improbable that Noah, well knowing the wickedness of the family of Ham, and especially their inclination to the idolatry of the antediluvians, might actually intend to separate them from the rest of mankind.

(O) Some learned men have imagined that this confusion of language, which the Hebrew calls of *Lip*, was only a temporary failure of pronunciation, which was afterwards removed. This they are led to conclude, from the agreement of the languages of these people in after times.

History of Berosus², in his history of the Babylonians, informs us, that Noah, at the foot of Mount Baris or Luban, where the ark rested, gave his children their last instructions, and then vanished out of sight. It is now generally believed that the Xitrusus of Berosus was Noah. Eupolemus[†], another Heathen writer, tells us, "that the city Babel was first founded, and afterwards the celebrated tower; both which were built by some of those people who escaped the deluge. They were the same with those who in after times were exhibited under the name of giants. The tower was at length ruined by the hand of the Almighty, and those giants were scattered over the whole earth." This quotation plainly intimates, that according to the opinion of the author, only the rascally mob of the Hamites, and their apostate associates, were engaged in this daring enterprize.

* Euseb. Chron.

† Euseb. Prep. Ev. lib. 9.

Indeed it can never be supposed that Shem, if he was alive at that period, as he certainly was, would co-operate in such an absurd and impious undertaking. That devout patriarch, we think, would rather employ his influence and authority to divert his descendants from an attempt which he knew was undertaken in contradiction to an express ordinance of Heaven: and it is surely very little probable that Elam, Ashur, Arphaxad, and Aram, would join that impious confederacy, in opposition to the remonstrances of their father.

The building of the tower, according to the most probable chronology, was undertaken at a period so late, that *all mankind* could not possibly have concurred in the enterprize.

Many of the fathers were of opinion, that Noah settled in Armenia, the country where the ark rested; and that his descendants did not leave that region for five generations[‡], during the space of 659 years. By this period the human race must have been so amazingly multiplied, that the plains of Shinar could not have contained them. According to the Samaritan Pentateuch, and the Septuagint version, Peleg was born in the 134th year of his father Eber. Even admitting the vulgar opinion, that the tower was begun to be built, and the dispersion consequent upon that event to have taken place at this era, the human race would have been by much too numerous to have universally concurred in one design.

‡ Euseb. Hist. lib. 1.

From these circumstances, we hope it appears that the whole mass of mankind was not engaged in building the tower; that the language of all the human race was not confounded upon that occasion; and that the dispersion reached only to a combination of Hamites, and of the most profligate part of the two other families, who had joined their wicked confederacy.

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We have pursued this argument to considerable length, because some have inferred, from the difference in languages existing at this day, that mankind cannot have sprung from two individuals; because, from the connection still existing among languages, some have been bold enough to question the fact, though plainly recorded in sacred history; and lastly, because we imagine that some of our readers, who do not pretend to peruse the writings of the learned, may be gratified by seeing the various opinions respecting the confusion of tongues, and the dispersion of mankind, collected into one mass, equally brief, we hope, and intelligible: and this view of these opinions, with the foundations on which they respectively rest, we think may suffice to prove, that the language of Noah was for some ages preserved unmixed among the descendants of both Shem and Japhet.

Language. 14 Therefore the original language preserved in the other two families.

To gratify still farther such of our curious readers as may not have access to more ample information, we shall in this place exhibit a brief detail of the circumstances which attended this fatal attempt. The people engaged in it have been held up as a profligate race. The Almighty himself denominates them "*the children of men*," which is the very appellation by which the antediluvian sinners were characterized; *the sons of God saw the daughters of men*, &c. Their design in raising this edifice was "*to make them a name, and to prevent their being scattered abroad upon the face of the whole earth* *."

* Gen. chap. xi.

Whatever resolution the rest of mankind might take, they had determined to maintain themselves on that spot. The tower was intended as a centre of union, and perhaps as a fortress of defence. Such a stupendous fabric, they imagined, would immortalize their memory, and transmit the name of their confederacy with eclat (P) to future ages. This design plainly intimates, that there was only a party concerned in the undertaking, since, had all mankind been engaged in it, the purpose would have been foolish and futile. Again, they intended, by making themselves *a name*, to prevent their being scattered abroad upon the face of the earth. This was an act of rebellion in direct contradiction to the divine appointment, which constituted their crime, and brought down the judgment of Heaven upon their guilty heads. The consequence of the confusion of languages was, that the projectors left off to build (Q), and were actually scattered abroad, contrary to their intention.

Abydenus, in his Assyrian annals, records, that the tower was carried up to heaven; but that the gods ruined it by storms and whirlwinds, and overthrew it upon the heads of those who were employed in the work, and that the ruins of it were called Babel.

15 Pagan tradition concerning the tower of Babel.

3 Q

bylon.

(P) Many foolish and absurd notions have been entertained concerning this structure. Some have imagined that they meant to take shelter there in case of a second deluge; others, that it was intended for idolatrous purposes; others, that it was to be employed as an observatory. Its dimensions have likewise been most extravagantly magnified. Indeed Strabo, l. 16. mentions a tower of immense size remaining at Babylon in his time, the dimensions of which were a stadium every way. This, however, seems to have been the remains of the temple of Bel or Belus.

(Q) For a description of the tower, see the article BABEL.

(R) See the Greek original of this quotation, Euseb. Chron. lib. 1. page 13.

History of bylon. Before this there was but one language subsisting among men: but now there arose *πολυγενῶν, a manifold speech*; and he adds, that a war soon after broke out between (s) Titan and Cronus." (τ) The Sybilline oracles give much the same account of this early and important transaction.

* Philip.
lib. 18.
cap. 3.

"Justin* informs us, that the Phœnicians who built Tyre were driven from Assyria by an earthquake. These Phœnicians were the descendants of Mizraim the youngest son of Ham; and were, we think, confederates in building the tower, and were driven away by the catastrophe that ensued. Many other allusions to the dispersion of this branch of the family occur in Pagan authors, which the limits to be observed in an inquiry of this nature oblige us to omit. Upon the whole, we think it probable that the country of Shinar lay desolate for some time after this revolution; for the dread of the judgment inflicted upon the original inhabitants would deter men from settling in that inauspicious region. At last, however, a new colony arrived, and Babel, or Babylon, became the capital of a flourishing kingdom.

† Bochar.
Phaleg.
lib. 1.
cap. 10.

Our readers, we believe, will expect that we should say something of Nimrod the mighty hunter, who is generally thought to have been deeply concerned in the transactions of this period. According to most authors, both ancient and modern, this patriarch was the leader of the confederates who erected the tower, and the chief instigator to that enterprize. But if the tower was built at the birth of Pheleg, according to the Hebrew computation, that chief was † either a child, or rather not born at that period (v). The Seventy have pronounced him a giant, as well as a huntsman. They have translated the Hebrew word *gebur*, which generally signifies *strong, mighty*, by the word *γίγας giant*; an idea which we imagine those translators borrowed from the Greeks. The antediluvian giants are called *Nephelim* and *Rephaim*, but never *Geburim*. The Rabbinical writers, who justly hated the Babylonians, readily adopted this idea (x); and the fathers of the church, and the Byzantine historians, have universally followed them. He has been called *Nimrod*, *Nebrod*, *Nymbroth*, *Nebroth*, and *Nebris*. Not a few have made him the first *Bacchus*, and compounded his name of *Bar*, a son, and *Cush*, that is, the son of *Cush*. Some have imagined that he was the Orion of the Pagans, whose shade is so nobly described by Homer ‡. But the etymology of this last name implies something (y) honourable, and very unsuitable to the idea of the tyrant *Nimrod*. It must be observed, however,

‡ Odyss. l. 1.
vers. 571.

that we find nothing in Scripture to warrant the supposition of his having been a tyrant; so far from it, that (z) some have deemed him a benefactor to mankind. See NIMROD.

The beginning of this prince's kingdom was Babel. Eusebius gives us first* a catalogue of six kings of the Chaldeans, and then another of five kings of Arabian extraction, who reigned in Chaldæa after them. This might naturally enough happen, since it appears that the inhabitants of those parts of Arabia which are adjacent to Chaldea were actually Cushites, of the † same family with the Babylonians.

The Cushites, however, were at last subdued, perhaps partly expelled Chaldea by the *Chasidim*, who probably claimed that territory as the patrimony of their progenitors. That the *Chasidim* were neither *Cushites*, nor indeed *Hamites*, is obvious from the name. The Hebrews, and indeed all the Orientals †, denominated both the people who inhabited the eastern coast of Arabia *Cushim*, and also the Ethiopians who sprung from the last mentioned people. Had the later inhabitants of Chaldea been the descendants of Cush, the Jewish writers would have called them *Cushim*. We find they called the Phœnicians *Chanaanim*, the Syrians *Aramim*, the Egyptians *Mizraim*, the Greeks *Jonim*, &c. The *Chasidim*, therefore, or modern inhabitants of Chaldea, were positively descended of one Chesed or Chased; but who this family-chief was, it is not easy to determine. The only person of that name whom we meet with in early times is the fourth son of Nahor §, the brother of Abraham; and some have been of opinion that the Chaldeans were the progeny of this same Chased. This appears to us highly probable, because both Abram and Nahor were natives of *Ur* of the *Chasidim*. The former, we know, in consequence of the divine command, removed to *Haran*, afterwards *Charra*; but the latter remained in *Ur*, where his family multiplied, and, in process of time, became masters of the country which they called the land of the *Chasidim*, from *Chesed* or *Chased*, the name of their ancestor. This account is the more probable, as we find the other branches of Nahor's family settled in the same neighbourhood (A).

How the Greeks came to denominate these people *χάλδαιοι Chaldæi*, is a question rather difficult to be resolved; but we know that they always affected to distinguish people and places by names derived from their own language. They knew a rugged, erratic nation (B) on the banks of the river *Thermodon*, in the territory of *Pontus*, bordering on *Armenia* the *Lesa*

- (s) This war was probably carried on between the leaders of the Hamites and Ashur upon their invasion.
(τ) Theoph. ad Antol. l. 2. page 107. ed. Paris 1636.
(v) Gen. chap. 10. verse 8, 9. "This man began to be a giant upon the earth; he was the giant hunter before the Lord God.—As Nymbrod the giant hunter before the Lord.
(x) See Mr Bryant's Analysis, vol. 3. page 34. et seq.
(y) Orion is compounded of the Hebrew *Or* "light," and *ion* "one of the names of the sun;" and Orion was probably one of the names of that luminary.
(z) See Shuckford's Connect. vol. 1. l. 3. page 179, 180. Also the authors of the Univer. Hist. vol. 1.
(A) Huz gave name to the country of Job; Elihu, one of Job's friends, was a Buzite of the kindred of Ram or Aram, another of the sons of Nahor. Aram, whose posterity planted Syria cava, was the grandson of Nahor by Kemuel. Hence it appears probable that Job himself was a descendant of Nahor by Huz his first born.
(B) See Eustat. in Dion. Perieg. ver. 768. Strabo, l. 12. page 543. Casaub. As the Chalybes were famous for manufacturing

History of Lefs. These, in ancient times, were called *Alybes*, or *Chalybes*, because they were much employed in forging and polishing iron. Their neighbours, at length, gave them the name of *Chald* or *Caled*, which imports, in the Armenian dialect, *fierce, hardy, robust*. This title the Greeks adopted, and out of it formed the word *Χαλδαῖοι* "Chaldeans."

The Mosaic history informs us (c), that Ashur went out of *that land* (Shinar) and built Nineveh and several other considerable cities. One of the successors of Ashur was the celebrated Ninus, who first broke the peace of the world*, made war upon his neighbours, and obliged them by force of arms to become his subjects, and pay tribute. Some authors make him the immediate successor of Ashur, and the builder of Nineveh. This we think is not probable; Eusebius, as we have observed above, gives a list of six Arabian princes who reigned in Babylon. These we take to have been the immediate successors of Nimrod, called *Arabians*; because these people were Cushites. Ninus might be reputed the first king of the Assyrians, because he figured beyond his predecessors; and he might pass for the builder of Nineveh, because he greatly enlarged and beautified that city. We therefore imagine, that Ninus was the fifth or sixth in succession after Ashur.

† Lib. 2. Ninus, according to Diodorus Siculus †, made an alliance with Ariæus king of the Arabians, and conquered the Babylonians. This event, in our opinion, put an end to the empire of the Hamites or Cushim in Shinar or Babylonia. The author observes, that the Babylon which figured afterwards did not then exist.

† Ch. xxiii. This fact is confirmed by the prophet Isaiah ‡: "Behold the land of the Chasidim; this people was not till Ashur founded it for them that dwell in the wilderness. They set up the towers thereof, &c." After Babylonia was subdued by the Assyrians under Ninus, the capital was either destroyed by that conqueror or deserted by the inhabitants. At length it was re-edified by some one or other of the Assyrian monarchs, who collected the roving Chasidim, and obliged them to settle in the new city. These were subject to the Assyrian empire till the reign of Sardanapalus, when both the Medes and Babylonians rebelled against that effeminate prince.

The Chasidim were celebrated by all antiquity for their proficiency in astronomy, astrology, magic, and curious sciences. Ur or Orchoe (D) was a kind of university for those branches of learning. Such was their reputation in those studies, that over a great part of Asia and Europe a Chaldean and an astrologer were synonymous terms. These sciences, according to the tradition of the Orientals, had been invented by Seth, whom they call *Edris*; and had been cultivated by his descendants downward to Noah, by whom they were transmitted to Shem, who conveyed them to Arphaxad and his posterity.

To us it appears probable, that the religious sentiments transmitted from Noah through the line of Shem, were kept alive in the family of Arphaxad, and so handed down to the families of Serug, Nahor, Terah, Abram, Nahor II. and Haran, &c. The Jewish rabbis, and all the Persian and Mahomedan writers, make Abraham contemporary with Nimrod; who, say they, persecuted him most cruelly for adhering to the true religion. That these two patriarchs were contemporary, is very improbable, since Nimrod was the third generation after Noah, and Abram the tenth. Abram has been invested by the rabbinical writers with every department of learning. According to them, he transported from Charræ into Chanaan and Egypt, astronomy, astrology, mathematics, geography, magic, alphabetical writing, &c. &c.

After the Babylonish captivity, when the Jews were dispersed over all the east, and began to make *profelytes* of the gate among the Pagans, wonderful things were reported of Abram with respect to his acquirements in human erudition, as well as his supereminence in virtue and piety. These legendary tales were believed by the profelytes, and by them retailed to their connections and acquaintances. But certainly the holy man either was not deeply versed in human sciences, or did not deem them of importance enough to be communicated to his posterity; since the Jews are, on all hands, acknowledged to have made little progress in these improvements. To think of raising the fame of Abraham, by classing him with the philosophers, betrays an extreme defect in judgment. He is intitled to praise of a higher kind; for he excelled in piety, was the father of the faithful, the root of the Messiah, 17
Legendary
tales concerning
Abraham.

3 Q 2

fiah,

manufacturing iron, so were they celebrated for making the choicest pieces of armour. They excelled in making *χαλκονι*, or coats of mail, or brigantines used by the bravest of the Persian horsemen. Bochart Phaleg, l. 3. cap. 12 and 13, has proved that the word *Cheliba* signifies "scales of brass or steel." From the word *Cheliba*, the Greeks formed their *Χαλκίβης*, *Chalybes*. Xenoph. Cyrop. l. 3. page 43. Steph. represents the Chaldeans, who inhabited a mountainous country bordering upon Armenia, as a very fierce warlike people. Ib. page 107. we have an example of their rapacious character. Id. ib. l. 4. page 192. Hen. Steph. we have an account of their bravery and of their arms. Another instance of their rapacity occurs in their plundering the cattle of Job.

(c) A dispute has arisen about the sense of verse 10. chap. 10. Out of that land went forth Ashur, and builded Nineveh. Some approve our translation, which we think is just; others, considering that the inspired writer had been just speaking of Nimrod and the beginning of his kingdom, are of opinion that it should be translated, And out of this land *He* (that is Nimrod) went into Ashur and builded Nineveh. This they make a military expedition, and a violent irruption into the territory of Ashur.

(D) Ur or Orchoe was situated between Nisibis and Corduena. See Ammianus Marcel. *Expositio Juliani*, l. 15. It lay not far from the river Tigris. Strabo, l. 16. page 739, tells us that the Chaldean philosophers were divided into different sects, the Orcheni, the Borsippeni, and several others. Diod. Sicul. likewise, lib. ii. page 82. Steph. gives an exact detail of the functions, profession, and establishment of the Chaldeans, to which we must refer our curious readers.

History of fish, and the friend of God. Before these, all other titles vanish away. Such of our readers, however, as have leisure enough, and at the same time learning enough to enable them to consult the rabbinical legends, will be furnished with a full and ample detail of his imaginary exploits and adventures. Others, who are either not willing or not qualified to peruse the writings of the rabbins, may consult Dr Hyde * de Relig. vet. Perf. and the authors of the Universal History †, where they will find materials sufficient to gratify their curiosity. We shall only observe, in addition to what we have already said, that the Persians, Chaldeans, and Arabians, pretended that their religion was that of Abraham; that honourable mention is made of him in the Koran; and that the name of Abraham or Ibrahim was celebrated over all the east. See ABRAHAM.

* Chap. ii.

† Vol. I.

In the progress of this disquisition, we have seen that the language of Noah was, in all probability, the same or nearly the same with that of Adam. Additions and improvements might be introduced, but still the radical stamina of the language remained unchanged. It has likewise, we hope, appeared, that the confusion of language at the building of the tower of Babel was only partial, and affected none but the rebellious crew of the race of Ham and the apostate part of the families of Shem and Japhet. We have concluded, that the main body of the race of Shem, at least, were neither dispersed nor their language confounded; and that consequently the descendants of that patriarch continued to speak their paternal dialect or the uncorrupted language of Noah. To these arguments we may take the liberty to add another, which is, that in all probability the worship of the true God was preserved in the line of Arphaxad, after the generality of the other sects had lapsed into idolatry. Out of this family Abraham was taken, in whose line the true religion was to be preserved. Whether Abraham was an idolator when he dwelt in Chaldea, the scripture does not inform us, though it seems to be evident that his father was. One thing, however, is certain, namely, that Jehovah (E) appeared to him, and pronounced a blessing upon him before he left Ur of the Chaldees. This circumstance no doubt indicates, that this patriarch had made uncommon advances in piety and virtue, even prior to his emigration. The progenitors of his family had been distinguished by adhering to the true religion. About this time, however, they began to degenerate, and to adopt the zabiism of their apostate neighbours. It was then that Abraham was commanded by Heaven to "leave his kindred and his father's house, and to travel into a land which was to be shown him." The Almighty intended that the true religion should be preserved in his line, and therefore removed him from a country and kindred, by the influence of whose bad example his religious principles might be endangered. His family had only of late apostatized; till that period they had preserved both the language and religion of their venerable ancestors.

But however much Abraham might differ from the other branches of his family in his religious sentiments,

his language was certainly in unison with theirs. The consequence of this unquestionable position is, that the language which he carried with him into Chanaan was exactly the same with that of his family which he relinquished when he began his peregrinations. But if this be true, it will follow, that the language afterwards denominated Hebrew, and that of the Chasidim or Chaldeans were originally one and the same. This position, we think, will not be controverted. There then an end of the dispute concerning the original language of mankind. We have advanced some presumptive proofs in the preceding pages, that the language of Adam was transmitted to Noah, and that the dialect of the latter was preserved in the line of Arphaxad downwards to the family of Abraham: and it now appears that the Hebrew and Chaldean were originally spoken by the same family, and of course were the same between themselves, and were actually the first language upon earth, according to the Mosaic history. Numberless additions, alterations, improvements, we acknowledge, were introduced in the course of 2000 years; but still the original stamina of the language were unchanged. Our readers will please to observe, that the Orientals are not a people given to change; and that this character, in the earliest ages, was still more prevalent than at present. This assertion, we presume, needs no proof.

In confirmation of these presumptive arguments, we may add the popular one which is commonly urged upon this occasion, viz. that the names of antediluvian persons and places mentioned by the sacred historian, are generally of Hebrew original, and significant in that language. Some of them, we acknowledge, are not so; but in this case it ought to be remembered, that a very small part of that language now exists, and that probably the radicals from which these words are descended are among the number of those which have long been lost.

SECT. I. *The Hebrew Language.*

HAVING thus proved the priority of the Hebrew to every other language that has been spoken by men, we shall now proceed to consider its nature and genius, from which it will appear still more evidently to be an original language, neither improved nor debased by foreign idioms. The words of which it is composed are short, and admit of very little flexion. The names of places are descriptive of their nature, situation, accidental circumstances, &c. Its compounds are few, and inartificially joined together. In it we find few of those artificial affixes which distinguish the other cognate dialects; such as the Chaldean, Syrian, Arabian, Phœnician, &c. We find in it no traces of improvement from the age of Moses to the era of the Babylonish captivity. The age of David and Solomon was the golden period of the Hebrew tongue; and yet, in our opinion, it would puzzle a critic of the nicest acumen to discover much improvement even during that happy era. In fact, the Jews were by no means an inventive people. We hear nothing of their progress in literary pursuits; nor do they seem to have been

(E) Compare Gen. chap. 12. ver. 2. with Acts chap. 7. verse 4.

^{Hebrew Language.} been industrious in borrowing from their neighbours. The laws and statutes communicated by Moses were the principal objects of their studies. These they were commanded to contemplate day and night; and in them they were to place their chief delight. The consequence of this command was, that little or no regard could be paid to taste, or any other subject of philosophical investigation. Every unimproved language abounds in figurative expressions borrowed from sensible objects. This is in a peculiar manner the characteristic of the language in question; of which it would be superfluous to produce instances, as the fact must be obvious even to the attentive reader of the English Bible.

In the course of this argument, we think it ought to be observed, and we deem it an observation of the greatest importance, that if we compare the other languages which have claimed the prize of originality from the Hebrew with that dialect, we shall quickly be convinced that the latter has a just title to the preference. The writers who have treated this subject, generally bring into competition the Hebrew, Chaldean, Syrian, and Arabian. Some one or other of these has commonly been thought the original language of mankind. The arguments for the Syrian and Arabian are altogether futile. The numerous improvements superinduced upon these languages, evidently prove that they could not have been the original language. In all cognate dialects, etymologists hold it as a maxim, that the least improved is likely to be the most ancient.

We have observed above, that the language of Abraham and that of the Chaldeans were originally the same; and we are persuaded, that if an able critic should take the pains to examine strictly these two languages, and to take from each what may reasonably be supposed to have been improvements or additions since the age of Abraham, he will find intrinsic evidence sufficient to convince him of the truth of this position. There appear still in the Chaldean tongue great numbers of (F) words the same with the Hebrew, perhaps as many as mankind had occasion for in the most early ages; and much greater numbers would probably be found if both languages had come down to us entire. The construction of the two languages is indeed somewhat different; but this difference arises chiefly from the superior improvement of the Chaldean. While the Hebrew language was in a manner stationary, the Chaldean underwent progressive improvements; was mellowed by antitheses, rendered sonorous by the disposition of vocal sounds, acquired a copiousness by compounds, and a majesty by affixes and prefixes, &c. In process of time, however, the difference became so great, that the Israelites did not understand the Chaldean language at the era of the

Babylonish captivity. This much the prophet * intimates, when he promises the pious Jews protection "from a fierce people; a people of a deeper speech than they could perceive; of a stammering tongue, that they could not understand." ^{Hebrew Language. * Isaiah, ch. xxxiii. vers. 19.}

The priority of the Chaldean tongue is indeed contended for by very learned writers. Camden† calls it the mother of all languages; and most of the fathers were of the same opinion. Amira‡ has made a collection of arguments, not inconsiderable, in favour of it; and Myriceus§, after him, did the same. Erpenius||, in his Oration for the Hebrew tongue, thought the argument for it and the Chaldean so equal, that he did not choose to take upon him to determine the question. ^{† Brit. ‡ Pref. ad Gram. Syr. § Pref. ad Gram. Chald. || Oratione de lingua Hebr. xii.}

Many circumstances, however, concur to make us assign the priority to the Hebrew, or rather to make us believe that it has suffered fewest of those changes to which every living tongue is more or less liable. If we strip this language of every thing obviously adventitious, we shall find it extremely simple and primitive.

1. Every thing masoretical, supposing the vowels and points (G) essential, was certainly unknown in its original character. 2. All the prefixed and affixed letters were added time after time, to give more compass and precision to the language. 3. The various voices, moods, tenses, numbers, and persons of verbs, were posterior improvements; for in that tongue, nothing at first appeared but the indeclinable radix. 4. In the same manner, the few adjectives that occur in the language, and the numbers and regimen of nouns, were not from the beginning. 5. Most of the Hebrew nouns are derived from verbs; indeed many of them are written with the very same letters. This rule, however, is not general; for often verbs are derived from nouns, and even some from prepositions. 6. All the verbs of that language, at least all that originally belonged to it, uniformly consist of three letters, and seem to have been at first pronounced as monosyllables. If we anatomize the Hebrew language in this manner, we shall reduce it to very great simplicity; we shall confine it to a few names of things, persons, and actions; we shall make all its words monosyllables, and give it the true characters of an original language. If at the same time we reflect on the small number of (H) radical words in that dialect, we shall be more and more convinced of its originality. ^{21 Reasons for maintaining the priority of the Hebrew.}

It will not be expected that we should enter into a minute discussion of the grammatical peculiarities of this ancient language. For these, we must refer our readers to the numerous and elaborate grammars of that tongue, which are everywhere easily to be found. We shall only make a few strictures, which naturally present themselves, before we dismiss the subject.

The generality of writers who have maintained the superior

(F) Most of the Chaldean names mentioned in Scripture are pure Hebrew words compounded; such as *Nebuchadnezzar*, *Nebuzaradan*, *Rabshakeh*, *Rabmag*, *Belsazzar*, *Rabfari*, *Nahar*, *Malabtha*, *Phrat* or *Pharad*, *Barofus*, *Carchemish*, *Ur*, *Cutha*, Heb. *Cush*, &c. All these words, and a multitude of others which we could mention, approach so near the Hebrew dialect, that their original is discernible at first sight. Most of these are compounds, which the limits prescribed us will not allow us to decompound and explain.

(G) The futility of these points will be proved in the following part of this section.

(H) The radical words in the Hebrew language, as it now stands, are about 500.

superior antiquity of the Hebrew language, have at the same time contended that all other languages of Asia, and most of those of Europe, have been derived from that tongue as their source and matrix. We, for our part, are of opinion, that perhaps all the languages in the eastern part of the globe are coeval with it, and were originally one and the same; and that the differences which afterwards distinguished them sprung from climate, caprice, inventions, religions, commerce, conquests, and other accidental causes, which will occur to our intelligent readers. We have endeavoured to prove, in the preceding pages, that all mankind were not concerned in the building of the fatal tower, nor affected by the punishment consequent upon that attempt: and we now add, that even that punishment was only temporary; since we find, that those very Hamites or Cushim, who are allowed to have been affected by it, did certainly afterwards recover the former organization of their *lip*, and differed not more from the original standard than the descendants of Japhet and Shem.

The Jewish rabbis have pretended to ascertain the number of languages generated by the vengeance of Heaven at the building of Babel. They tell us that mankind was divided into 70 nations and 70 languages, and that each of these nations had its tutelar or guardian angel. This fabulous legend is founded on the number of the progeny of Jacob at the time when that patriarch and his family went down into Egypt. Others attribute its origin to the number of the sons and grandsons of Noah, who are enumerated Gen. chap. x.

* Clem.
Alex. Strom.
Euseb.
Chron. lib. i.
Epiphanius.
Hæres.
August. &c.
† Deut.
ch. xxxii.
verse 8.

The fathers* of the church make the languages at the confusion to amount to 72; which number they complete by adding Cainan and Elishah, according to the Septuagint, who are not mentioned in the Hebrew text. This opinion, they think, is supported by the words of Moses, when he saith, that † “when the Most High divided to the nations their inheritance, when he separated the sons of Adam, he set the bounds of the people according to the number of the tribes of Israel.” That is, say they, he divided them into 72 nations, which was the number of the children of Israel when they came into Egypt. The Targum of Ben-Uzziel plainly favours this interpretation; but the Jerusalem Targum intimates that the number of nations were only 12, according to the number of the tribes of Israel. This passage, however, seems to refer to the tribes of the Chanaanites; and imports, that the Almighty assigned to the different septa of that family such a tract of land as he knew would make a sufficient inheritance for the children of Israel ‡. Others have increased the different languages of the dispersion to 120; but the general opinion has fixed them to 70 or 72. Our readers need scarce be put in mind that these opinions are futile and absurd; neither founded in Scripture, profane history, or common sense. At the same time, it must not be omitted, that, according to Horapollon §, the Egyptians held, that the world was divided into 72 habitable regions; and that, in consequence of this tradition, they made

† Pacanini
Episcop.
Bercun.
apud Hieron
in Catalogo
Epist. 22.

§ 14 page
25. Horapoll.

the cynocephalus the emblem of the world, because that in the space of 72 days that animal pines away and dies.

It has been made a question, whether the Hebrew language was denominated from Heber the progenitor of Abraham, or from a word which in that tongue imports *over, beyond*. Most of the Christian fathers, prior to St Origen, believed that both the Gentile name *Hebrew*, and the name of the language, were derived from the name of the patriarch; but that learned man imagined, that Abraham was called the *Hebrew*, not because he was a descendant of Heber, but because he was a transfluvianus, or from beyond the river Euphrates. The learned Bochart* has strained hard to prove the former position; but to us his arguments do not appear decisive. We are rather inclined to believe, that Abraham was called *Chibri*, (Hebrew), from the situation of the country from which he emigrated when he came to the country of Chanaan; and that in process of time that word became a Gentile appellation, and was afterwards applied to his posterity (1) often by way of reproach, much in the same manner as we say a *Northlander*, a *Norman*, a *Tramontane*, &c.

Here we may be indulged an observation, namely, that Abraham, a Hebrew, lived among the Chaldeans, travelled among the Chanaanites, sojourned among the Philistines, lived some time in Egypt; and in all appearance conversed with all those nations without any apparent difficulty. This circumstance plainly proves, that all these nations at that time spoke nearly the same language. The nations had not yet begun to improve their respective dialects, nor to deviate in any great measure from the monosyllabic tongue of the Hebrews. With respect to the language of Chanaan, afterwards the Phœnician, its similarity to the Hebrew is obvious from the names of gods, men, cities, mountains, rivers, &c. which are the very same in both tongues, as might be shown in numberless cases, were this a proper place for etymological researches.

Before we dismiss this part of our subject, we would wish to gratify our unlearned readers with a brief account of the Hebrew letters, and of the Masoretical points which have been in a manner ingrafted on these letters. In the course of this deduction, we shall endeavour to follow such authors as are allowed to have handled that matter with the greatest acuteness, learning, and perspicuity. If, upon any occasion, we should be tempted to hazard a conjecture of our own, it is cheerfully submitted to the candour of the public.

Much has been written, and numberless hypotheses proposed, with a view to investigate the origin of *alphabetical writing*. To give even an abridged account of all these, would fill many volumes. The most plausible, in our opinion, is that which supposes that the primary characters employed by men were the figures of material objects analogous to those of the Mexicans, so often mentioned by the authors who

have

(1) The Egyptians might not eat bread with the Hebrews, for that is an abomination to the Egyptians. The Philistines (Samuel I. *pass.*) always call the Israelites *Hebrews* by way of reproach.

Hebrew Language. have written the history of that people at the era of the Spanish invasion of their country. As this plan was too much circumscribed to be generally useful, hieroglyphical figures were in process of time invented as subsidiaries to this contracted orthography. In this scheme, we imagine, the process was somewhat more extensive. A *lion* might be sketched, to import fierceness or valour; an *ox*, to denote strength; a *flag*, to signify swiftness; a *bare*, to intimate timorousness, &c.

24
Origin of
alphabetic
writing.

The next step in this process would naturally extend to the inventing and appropriating of a few arbitrary characters, for representing abstract ideas, and other relations, which could not be well ascertained by the methods above-mentioned. These arbitrary signs might readily acquire a currency by compact, as money and medals do over a great part of the world.— Upon this plan we imagine the ancient Chinese formed their language.

But neither the picture nor the hieroglyphic, nor the method of denoting *ideas* by arbitrary characters appropriated by compact, could ever have arrived at such perfection as to answer all the purposes of ideal communication. The grand desideratum then would be to fabricate characters to represent simple sounds, and to reduce these characters to so small a number as to be easily learned and preserved in the memory. In this attempt the Chinese have notoriously failed; their letters, or rather their characters, are so numerous, that few, if any, of their most learned and industrious authors, have been able to learn and retain the whole catalogue. Indeed those people are not able to conceive how any combinations of 20 or 30 characters should be competent to answer all the purposes of written language.

* Hesych.

† Lucan.

Many different nations have claimed the honour of this invention. The Greeks ascribed it to the Phœnicians; and consequently used the word *φοινικισμὸς* *, to ascribe the Phœnician, in the same sense with *αναγινωσκεῖν*, to read; and consequently the poet † ascribes the invention to the same ingenious people. The Greeks borrowed their letters from the Phœnicians, and of course looked up to them as the inventors.

† Bibl. l. 1.
pag. 10.
Steph.

|| Nat. Hist.
lib. 7. c. 56.

Others have attributed the invention to the Egyptians. That people ascribed every useful and ingenious invention to their Thyoth, or Mercury Trismegistus. Plato seems to have believed this tradition (κ), and pretends to record a dispute between the king of Egypt that then reigned and this personage, with respect to the influence that the art of alphabetic writing might possibly have upon the improvements of mankind in science and liberal arts. Diodorus the Sicilian ‡ gives a similar history of the same invention, but carries it back to the reign of Osiris.

Pliny informs us ||, that Gellius attributed letters to the same Egyptian Mercury, and others to the Syrians; but that for "his part, he thought that the Assyrian letters were eternal." That learned Roman then imagined, that the Assyrian letters had existed at

a period prior to all the records of history; which was in fact the case. By the Assyrian letters, he must mean the Chaldaic, and by the Syrian probably the Hebrew. The earliest Greek historians generally confound the Jews with the Syrians. Herodotus, enumerating the people who had * learned circumcision from the Egyptians, mentions the Syrians of Palestine; and elsewhere he tells us, that Necho † beat the Syrians, and took Cadytis, a large and populous city belonging to that people. Hence it is evident that the Syrian alphabet, or the Syrian letters, were the same with the Hebrew. That the Assyrian or Chaldaic and Hebrew languages were the same, has, we hope, been fully proved already: that their letters were the same in their original structure, can scarce be controverted. These letters, we think, were antediluvian; whether, to use the expression of Plato, they were dictated by some god, or fabricated by some man divinely inspired. As this opinion may admit some dispute, we shall take the liberty to subjoin our reasons.

* Lib. 2.

c. 104.

† Ibid.

c. 159.

25

Antediluvian.

1. It appears that the era of this invention is buried in impenetrable obscurity. Had an invention of such capital importance to mankind been made in the postdiluvian ages, we imagine the author would have been commemorated in the historical annals of the country where he lived (L).

2. The art of writing in alphabetical characters, according to the sacred records, was practised at so early a period, that there was not a long enough interval between that and the deluge to give birth to that noble invention. If we consider the state of the world during some ages after that disastrous event, we shall quickly be convinced that little respite could be found from the labour and industry indispensably requisite to provide the necessaries, and only a few of the conveniences, of life. Such a state of things was certainly most unfavourable to the invention of those arts and improvements which contribute nothing towards procuring the accommodations of life. The consequence is obvious.

Moses has recorded the history of the creation, of a few of the capital transactions of the antediluvian world, the birth, the age, the death, of the lineal descendants of Seth. He has preserved the dimensions of the ark, the duration of the universal deluge, its effects upon man and all terrestrial animals, the population of the world by the posterity of Noah, the age, &c. of the patriarchs of the line of Shem, from which his own ancestors had sprung. To this he has subjoined the petty occurrences which diversified the lives of Abraham, Isaac, and Jacob, and their descendants. Whence did the historian derive his information? We believe few of our readers will be so enthusiastic as to imagine that the author received it from divine inspiration. Tradition is a fallible guide; and in many cases the accounts are so minutely precise, as to defy the power of that species of conveyance. The inspired author must certainly have extracted

(κ) See *Phædrus*, page 1240. See also page 374. *Phil.*

(L) It is true, the Egyptians attribute the invention to their Thoth, and the Phœnicians to their Hercules, or Melicerta or Baal; but these were only imaginary personages.

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tracted his abridgment from written memoirs, or histories of the transactions of his ancestors regularly transmitted from the most early periods. These annals he probably abridged, as Ezra did afterwards the history of the Kings of Israel. If this was the case, as it most certainly was, the art of writing in alphabeti-

cal letters must have been known and practised many ages before Moses. It has indeed been pretended, that the Jewish decalogue, inscribed upon two tables of stone, was the very first specimen of alphabetical writing. The arguments adduced in proof of this fact are lame and inconclusive (M). Had that been the

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(M) The most ingenious and plausible of those arguments which have fallen under our observation, is given by Mr Johnson vicar of Cranbrook, a writer of great learning and piety, who flourished in the beginning of the present century, and whose works deserve to be more generally known than we have reason to think they are at present. After endeavouring to prove that alphabetical writing was not practised before the era of Moses, and expatiating upon the difficulty of the invention, this excellent scholar attempts to show, that the original Hebrew alphabet was actually communicated to the Jewish legislator at the same time with the two tables of the law. "I know not (says he) any just cause why the law should be *written by God*, or by an *angel* at his command, except it were for want of a man that could well perform this part. This could give no addition of authority to the law, especially after it had been published in that astonishing and miraculous manner at Mount Sinai. The true writing of the original was indeed perfectly adjusted, and precisely ascertained to all future ages, by God's giving a copy of it under his own hand: but this, I conceive, had been done altogether as effectually by God's dictating every word to Moses, had he been capable of performing the office of an amanuensis." The learned writer goes on to suppose, that it was for the purpose of *teaching Moses the alphabet*, that God detained him forty days in the mount; and thence he concludes, that the Decalogue was the first writing in alphabetical characters, and that those characters were a divine, and not a human invention.

It is always rash, if not something worse, to conceive reasons not assigned by God himself, for any particular transaction of his with those men whom he from time to time inspired with heavenly wisdom. That it was *not* for the purpose of teaching Moses the alphabet that God detained him forty days in the mount, when he gave him the two tables of the law, seems evident from his detaining him just as many days when he gave him the second tables after the first were broken. If the legislator of the Jews had not been sufficiently instructed in the art of reading during his first stay in the mount, he would have been detained longer; and it is not conceivable, that though in a fit of pious passion he was so far thrown off his guard as to break the two tables, his mind was so totally unhinged by the idolatry of his countrymen, as to forget completely an art which, by the supposition, the Supreme Being had spent *forty days* in teaching him! "But if Moses could, at his first ascent into the mount, perform the office of an amanuensis, why are the original tables said to have been written by the finger of God, and not by him who wrote the second?" We pretend not to say why they were written by God rather than man; but we think there is sufficient evidence, that by whomsoever they were written, the characters employed were of human invention. The Hebrew alphabet, without the Masoretic points, is confessedly defective; and every man who is in any degree acquainted with the language, and is not under the influence of inveterate prejudice, will readily admit that those points are no improvement. But we cannot, without impiety, suppose an art invented by infinite wisdom, to fall short of the utmost perfection of which it is capable: an alphabet communicated to man by God, would undoubtedly have been free both from defects and from redundancies; it would have had a distinct character for every simple sound, and been at least as perfect as the Greek or the Roman.

But we need not fill our pages with reasonings of this kind against the hypothesis maintained by Mr Johnson. We know that "Moses wrote all the words of the Lord," *i. e.* the substance of all that had been delivered in *Exod. xx, xxi, xxii, xxiii.* before he was called up into the mount to receive the tables of stone; nay, that he had long before been commanded by God himself to "write in a book" an account of the victory obtained over Amalek (*Exod. xvii. 14*). All this, indeed, the learned writer was aware of; and to reconcile it with his hypothesis, he frames another, more improbable than even that which it is meant to support. "It is not unreasonable (says he) to believe that God had written these tables of stone, and put them in mount Horeb, from the time that by his angel he had there first appeared to Moses; and that, therefore, all the time after, while he kept Jethro's sheep thereabouts, he had free access to those tables, and perused them at discretion." But if belief should rest upon evidence, we beg leave to reply, that to believe all this would be in the highest degree unreasonable; for there is not a single hint in Scripture of the tables having been written at so early a period, or upon such an occasion, as God's first appearance to Moses in the burning bush. We know how reluctant Moses was to go upon the embassy to which he was then appointed; and it is strange, we think passing strange, that when he records so faithfully his own backwardness, and the means made use of by God to reconcile him to the arduous undertaking, he should make no mention of these important tables, if at that period he had known any thing of their existence. Besides all this, is it not wonderful, if Moses had been practising the art of writing, as our author supposes, from the time of the burning bush to the giving of the law, he should then have stood in need of *forty days* teaching from God, to enable him to *read* with ease the first tables; and of other forty, to enable him to *write* the second? This gives such a mean view of the natural capacity of the Hebrew legislator, as renders the hypothesis which implies it wholly incredible. See a *Collection of Discourses, &c. in two volumes*, by the reverend John Johnson, A. M. vicar of Cranbrook in Kent.

Hebrew Language. the case, some notice must have been taken of so palpable a circumstance. Moses wrote out his history, his laws, and his memoirs; and it appears plainly from the text, that all the learned among his countrymen could read them. Writing was then no novel invention in the age of the Jewish legislator, but current and generally known at that era.

The patriarch Job lived at an earlier period (N). In that book we find many allusions to the art of writing, and some passages which plainly prove its existence. This shows that alphabetical characters were not confined to the chosen seed, since Job was in all probability a descendant of Huz, the eldest son of Nahor * the brother of Abraham. From this circumstance, we think we may fairly conclude, that this art was known and practised in the family of Terah the father of Abraham.

3. There was certainly a tradition among the Jews in the age of Josephus, that writing was an antediluvian invention †. That historian pretends, that the descendants of Seth erected two pillars, the one of stone and the other of brick, and inscribed upon them their astronomical observations and other improvements.— This legend shows that there did exist such an opinion of the antiquity of the art of writing.

4. There must have been a tradition to the same purpose among the Chaldeans, since the writers who have copied from Berosus, the celebrated Chaldean historian (O), speak of alphabetical writing as an art well known among the antediluvians. According to them, Oannes the Chaldean legislator gave his disciples "an insight into letters and science. This person also wrote concerning the generation of mankind, of their different pursuits, of civil polity, &c. Immediately before the deluge (say they) the god Cronus appeared to Sisuthrus or Xisuthrus, and commanded him to commit to writing the beginning, improvement, and conclusion of all things down to the present term, and to bury these accounts securely in the temple of the Sun at Seppara." All these traditions may be deemed fabulous in the main; but still they evince that such an opinion was current, and that though the use of letters was not indeed eternal (P), it was, however, prior to all the records of history; and of course, we think, an antediluvian discovery.

27 The original alphabet preserved in the family of Noah. This original alphabet, whatever it was, and however constructed, was, we think, preserved in the family of Noah, and from it conveyed down to succeeding generations. If we can then discover the original Hebrew alphabet, we shall be able to investigate the primary species of letters expressive of those articulate sounds by which man is in a great measure distinguished from the brute creation. Whatever

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might be the nature of that alphabet, we may be convinced that the ancient Jews deemed it sacred, and therefore preserved it pure and unmixed till the Babylonish captivity. If, then, any monuments are still extant inscribed with letters prior to that event, we may rest assured that these are the remains of the original alphabet.

There have, from time to time, been dug up at Jerusalem, and other parts of Judea, coins and medals, and medallions, inscribed with letters of a form very different from those square letters in which the Hebrew Scriptures are now written.

When the Samaritan Pentateuch was discovered (Q), it evidently appeared that the inscriptions on those medals and coins were drawn in genuine Samaritan characters. The learned Abbé Barthelemi, in his * dissertation "on the two medals of Antigonus * Mem de king of Judea, one of the later Asmonean princes, l'Academ. de l'Inscr. &c. proves that all the inscriptions on the coins and medals of Jonathan and Simon Macabeus, and also on his, were invariably in the Samaritan character, down to the 40th year before the Christian era."

It were easy to prove, from the Mishna and Jerusalem talmud, that the Scriptures publicly read in the synagogues to the end of the second century were written in the Samaritan character, we mean in the same character with the Pentateuch in question. As the ancient Hebrew, however, ceased to be the vulgar language of the Jews after their return from the Babylonish captivity, the copies of the Bible, especially in private hands, were accompanied with a Chaldaic paraphrase; and at length the original Hebrew character fell into disuse, and the Chaldaic was universally adopted.

It now appears that the letters inscribed on the ancient coins and medals of the Jews were written in the Samaritan form, and that the Scriptures were written in the very same characters: we shall therefore leave it to our readers to judge whether (considering the implacable hatred which subsisted between these two nations) it be likely that the one copied from the other; or at least that the Jews preferred to the beautiful letters used by their ancestors, the rude and inelegant characters of their most detested rivals. If, then, the inscriptions on the coins and medals were actually in the characters of the Samaritan Pentateuch (and it is absurd to suppose that the Jews borrowed them from the Samaritans), the consequence plainly is, that the letters of the inscriptions were those of the original Hebrew alphabet, coeval with that language, which we dare to maintain was the first upon earth.

It may, perhaps, be thought rather superfluous to

3 R

men.

(N) We have seen a manuscript, which may one day see the light, in which it is shown, with great probability, that Job was nearly cotemporary with the patriarch Jacob.

(O) Apollodorus, Alexander Polyhistor, Abydenus. See Syncellus, cap. 39. et seq. Euseb. Chron. l. i. page 3.

(P) Plin. Nat. Hist. l. 7. page 413. — *Ex quo apparet aternus literarum usus.*

(Q) The celebrated Archbishop Usher was the first who brought the Samaritan Pentateuch into Europe. In a letter to Ludovicus Capellus "he acknowledges, that the frequent mention he had seen made of it by some authors, would not suffer him to be at rest till he had procured five or six copies of it from Palestine and Syria."

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mention, that the Samaritan colonists, whom the kings of Assyria planted in the cities of Samaria (R), were natives of countries where Chaldaic letters were current, and who were probably ignorant of the Hebrew language and characters. When those colonists embraced the Jewish religion, they procured a copy of the Hebrew Pentateuch written in its native character, which, from superstition, they preserved inviolate as they received it; and from it were copied successively the others which were current in Syria and Palestine when Archbishop Usher procured his.

From the reasons above exhibited, we hope it will appear, that if the Hebrew alphabet, as it appears in the Samaritan Pentateuch, was not the primitive one, it was at least that in which the Holy Scriptures were first committed to writing.

† Chron in
anno 4740.
† Pref. I
Reg.

30
Which was
introduced
by Ezra.

Scaliger has inferred, from a passage in Eusebius†, and another in St Jerom‡, that Ezra, when he reformed the Jewish church, transcribed the Scriptures from the ancient characters of the Hebrews into the square letters of the Chaldeans. This, he thinks, was done for the use of those Jews who, being born during the captivity, knew no other alphabet than that of the people among whom they were educated.—This account of the matter, though probable in itself, and supported by passages from both Talmuds, has been attacked by Buxtorf with great learning and no less acrimony. Scaliger, however, has been followed by a crowd of learned men (s), whose opinion is now pretty generally espoused by the sacred critics.

Having said so much concerning the Hebrew alphabet in the preceding pages, we find ourselves laid under a kind of necessity of hazarding a few strictures on the vowels and Masoretic points; the *first* essential, and the *last* an appendage, of that ancient language. The number of the one, and the nature, antiquity, and necessity of the other, in order to read the language with propriety and with discrimination, have been the subject of much and often illiberal controversy among philological writers. To enter into a minute detail of the arguments on either side, would require a complete volume: we shall, therefore, briefly exhibit the state of the controversy, and then adduce a few observations, which, in our opinion, ought to determine the question.

31
The He-
brew
vowels.

The controversy then is, Whether the Hebrews used any vowels; or whether the points, which are now called by that name, were substituted instead of them? or if they were, whether they be as old as Mo-

ses, or were invented by Ezra, or by the Massorites (τ)? This controversy has exercised the wits of the most learned critics of the two last centuries, and is still far enough from being determined in the present. The Jews maintain, that these vowel points (υ) were delivered to Moses along with the tables of the law; and consequently hold them as sacred as they do the letters themselves. Many Christian authors who have handled this subject, though they do not affirm their divine original, nor their extravagant antiquity, pretend, however, that they are the only proper vowels in the language, and regulate and ascertain its true pronunciation. Though they differ from the Jews with respect to the origin of these points, they yet allow them a pretty high antiquity, ascribing them to Ezra and the members of the great synagogue.

At length, however, about the middle of the 16th century, Elias Levita, a learned German Jew who then flourished at Rome, discovered the delusion, and made it appear that these appendages had never been in use till after the writing of the talmuds, about 500 years after Christ. This innovation raised Elias a multitude of adversaries, both of his own countrymen and Christians. Among the latter appeared the two Buxtorfs, the father and the son, who produced some cabbalistical books of great antiquity (x), at least in the opinion of the Jews, in which there was express mention of the points. The Buxtorfs were answered by Capellus and other critics*, till Father Morinus‡, having examined all that had been urged on both sides, produced his learned dissertation on that subject; against which there has been nothing replied of any consequence, whilst his work has been universally admired, and his opinion confirmed by those that have beaten the same field after him.

According to this learned father, it plainly appears that neither Origen, nor St Jerome, nor even the compilers of the talmuds, knew any thing of what has been called the vowel points; and yet these books, according to the same author, were not finished till the seventh century. Even the Jewish rabbis who wrote during the eighth and ninth centuries, according to him, were not in the least acquainted with these points. He adds, that the first vestiges he could trace of them were in the writings of *rabbi Ben Aber* chief of the western, and of *rabbi Ben Naphtali* chief of the eastern, school, that is, about the middle of the tenth century; so that they can hardly be said to be older than the beginning of that period.

Some

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32
The Maso-
retic points
a modern
invention.

* Walton,
Dupin, and
Vossius.
‡ Dissert.
Bibl.

(R) II. Kings, chap. xvii. ver. 24. "And the king of Assyria brought men from Babylon, and from Cuthah, and from Avah, and from Hamath, and from Sepharvaim, and placed them in the cities of Samaria." Babylon, and Cuthah, and Avah, were neighbouring cities, and undoubtedly both spoke and wrote in the Chaldaic style. The natives of Hamath spoke the Syriac, which at that time differed very little from the Chaldaic.

(s) Casaubon, Grotius, Vossius, Bochart, Morin, Brerewood, Walton, Prideaux, Huet, and Lewis Capel, always a sworn enemy to Buxtorf. All, then, have maintained the same ground with Scaliger: how truly, appears above.

(τ) The term *masorah* or *massoreth* signifies "tradition;" and imports the unwritten canon by which the reading and writing of the sacred books was fixed.

(υ) These points are 14 in number, whose figures, names, and effects, may be seen in most Hebrew grammars.

(x) These books are the *Babir*, *Zabar*, and the *Kizri*. As for the *Kizri*, the Jews make it about 1900 years old; and the other about a century later. But the fidelity of the Jews in such matters cannot be relied upon.

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Language.

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Some learned men (v) have ascribed the invention of the vowel points in question to the rabbis of the school of Tiberias; which, according to them, flourished about the middle of the second century. This opinion is by no means probable, because it appears plain from history, that before that period all the Jewish seminaries in that province were destroyed, and their heads forced into exile. Some of these retired into Babylonia, and settled at Sora, Naberda, and Pumbeditha, where they established famous universities. After this era there remained no more any rabbinical schools in Judæa, headed by professors capable of undertaking this difficult operation, nor indeed of sufficient authority to recommend it to general practice, had they been ever so thoroughly qualified for executing it.

33
The *matres
lectionis*.

Capellus and father Morin, who contend for the late introduction of the vowel-points, acknowledge that there can certainly be no language without vocal sounds, which are indeed the soul and essence of speech; but they affirm that the Hebrew alphabet actually contains vowel characters, as well as the Greek and Latin and the alphabets of modern Europe. These are *aleph, be, vau, jod*. These they call the *matres lectionis*, or, if you please, the parents of reading. To these some, we think very properly, add *ain* or *oin, ojin*. These, they conclude, perform exactly the same office in Hebrew that their descendants do in Greek. It is indeed agreed upon all hands, that the Greek alphabet is derived from the Phœnician, which is known to be the same with the Samaritan or Hebrew. This position we shall prove more fully when we come to trace the origin of the Greek tongue. Hitherto the analogy is not only plausible, but the resemblance precise. The Hebrews and Samaritans employed these vowels exactly in the same manner with the Greeks; and so all was easy and natural.

34
Objections
answered.

But the asserters of the Masoretic system maintain, that the letters mentioned above are not vowels but consonants or aspirations, or any thing you please but vocal letters. This they endeavour to prove from their use among the Arabians, Persians, and other oriental nations: But to us it appears abundantly strange to suppose that the Greeks pronounced *beta, gamma, delta*, &c. exactly as the Hebrews and the Phœnicians did, and yet at the same time did not adopt their mode of pronunciation with respect to the five letters under consideration. To this argument we think every objection must undoubtedly yield. The Greeks borrowed their letters from the Phœnicians; these letters were the Hebrew or Samaritan. The Greeks wrote and (z) pronounced all the other letters of their alphabet, except the five in question, in the same manner with their originals of the east: if they did so, it obviously follows that the Greek and oriental office of these letters was the same.

Another objection to reading the Hebrew without the aid of the Masoretic vowel points, arises from the consideration, that without these there will be a

great number of radical Hebrew words, both nouns and verbs, without any vowel intervening amongst the consonants, which is certainly absurd. Notwithstanding this supposed absurdity, it is a well known fact, that all the copies of the Hebrew scriptures, used in the Jewish synagogues throughout the world, are written or printed without points. These copies are deemed sacred, and kept in a coffer with the greatest care, in allusion to the ark of the testimony in the tabernacle and temple. The prefect, however, reads the portions of the law and hagiographa without any difficulty. The same is done by the remains of the Samaritans at this day. Every oriental scholar knows that the people of these countries look upon consonants as the stamina of words. Accordingly, in writing letters, in dispatches upon business, and all affairs of small moment, the vowels are generally omitted. It is obvious, that in every original language the sound of the vowels is variable and of little importance. Such was the case with the Hebrew tongue: Nor do we think that the natives of the country would find it a matter of much difficulty to learn to read without the help of the vowels. They knew the words beforehand, and so might readily enough learn by practice what vowels were to be inserted.

When the Hebrew became a dead language, as it certainly was in a great measure to the vulgar after the return from the Babylonish captivity; such subsidiaries might, we think, have been useful, and of course might possibly have been adopted for the use of the vulgar: but the scribe, the lawyer, and the learned rabbi, probably disdained such beggarly elements. We shall in this place hazard a conjecture, which, to us at least, is altogether new. We imagine that the Phœnicians, who were an inventive, ingenious people, had, prior to the age of Cadmus, who first brought their letters into Greece, adopted the more commodious method of inserting the vowels in their proper places; whereas the Jews, zealously attached to the customs of their ancestors, continued to write and read without them. In this manner the Gephuræi †, who were the followers of Cadmus, communicated them to the Jews their neighbours. We are convinced that the materials of the Greek tongue are to be gleaned up in the east; and upon that ground have often endeavoured to trace the origin of Greek words in the Hebrew, Phœnician, Chaldean, and Arabian languages. Reading without the vowel points we have seldom failed in our search; but when we followed the method of reading by the Masoretic points, we seldom succeeded; and this, we believe, every man of tolerable erudition who will make a trial will find by experience to be true. This argument appears to us superior to every objection. Upon this basis, the most learned Bochart has erected his etymological fabric, which will be admired by the learned and ingenious as long as philology shall be cultivated by men.

* Herod.
lib. i
cap 56.

35
Proof that
the Maso-
retic points
are mo-
dern,

3 R 2

It

(v) See Buxtorf the father, in Tiber. cap. 5, 6, 7. Buxtorf the son de Antiq. Punct. P. II. 11.

(z) This is so true, that, according to Hesychius and Suidas, *ποινικισμῶν*, to act the Phœnician, signified "to read."

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It has been urged by the zealots for the Masoretic system, that the Arabians and Persians employ the vowel points. That they do so at present is readily granted; but whether they did so from the beginning seems to be the question. That Arabia was overspread with Jewish exiles at a very early period, is abundantly certain. It was natural for them to retire to a land where they would not hear of war nor the sound of the trumpet. Accordingly we find that, prior to the age of the Arabian impostor, Arabia swarmed with Jewish settlements. From these Jews, it is highly probable that their neighbours learned the use of the points in question; which in the course of their conquests the Saracens communicated to the Persians.

It has been alleged with great show of reason, that without the vowel points, it is often impossible to develop the genuine signification of many words which occur frequently in the language; many words of different and sometimes opposite significations are written with exactly the same consonants. Without the points then, how are we to know the distinction? In answer to this objection, we beg leave to observe, that, during the first period of a language, it is impossible that there should not occur a number of similar sounds of different significations. This is surely to be attributed to the poverty of the language. When a few terms have been once fabricated, men will rather annex new significations to old terms, than be at the expence of time or thought to invent new ones. This must have been the case with the Hebrew in particular; and indeed no language on earth is without instances of this inconveniency, which, however, in a living tongue, is easily overcome by a difference of accent, tone, gesture, pronunciation; all which, we think, might obviate the difficulty.

From the preceding arguments, we think ourselves authorized to infer that the Masora is a novel system, utterly unknown to the most ancient Jews, and never admitted into those copies of the Scriptures which were deemed most sacred and most authentic by that people.

According to ORIGEN.

Brêshith bara Elôeim eth ashamaim oueth aares.

Ouaares aietha Thôau ouboou ouôsekh al phne The-
ôm ourouê elôeim maraepheth al phne amaim.

Ouiômer elôeim iei ôr ouiei ôr.

Ouiar elôeim eth aôr khi tôb ouiabdêl elôeim bèn
aôr oubên aôsekh.

Upon the whole, we presume to give it as our opinion, that in the most early periods, the vowels *aleph*, *he*, *jod* or *yod*, *vau* or *uau*, and perhaps *oin* or *ajin*, were regularly written wherever they were sounded.

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And the
practice of
the ancient
Greeks.

This to us appears plain from the practice of the ancient Greeks. It is agreed on all hands that the Samaritan and Phœnician alphabets were the same; and that the former was that of the Jews originally. The Phœnicians certainly wrote the vowels exactly, for so did the Greeks who copied their alphabet: If the Phœnicians wrote their vowels, so then did the Jews of the age of Cadmus; but Cadmus was contemporary with some of the earliest judges of Israel; the consequence is evident, namely, that the Jews wrote their

With respect to the original introduction of the points, we agree with the learned and judicious * Dr Prideaux, who imagines that they were gradually introduced after the Hebrew became a dead language, with a view to facilitate the learning to read that language, more especially among the vulgar. By whom they were introduced, we think, cannot easily be determined; nor is it probable that they were all introduced at once, or by one and the same person. They have been ascribed to Ezra by many, for no other reason that we can discover but to enhance their authenticity, and because the sentiment is analogous to the other articles of reformation established by that holy priest. If our curious reader should not be satisfied with the preceding detail, we must remit him to Capellus and Morinus on the one side, and the two Buxtorfs, Schultens, and Dr James Robertson professor of oriental languages in the university of Edinburgh, on the other. This learned orientalist, in his dissertation prefixed to his *Clavis Pentateuchi*, has collected and arranged, with a true spirit of criticism, every thing that has been advanced in favour of the Masoretic system.—*Si Pergama dextra defendi possent, etiam hac defensa fuissent.*

St Origen, who flourished about the beginning of the 3d century, was a profound Hebrew scholar. He published a most laborious and learned work, which is generally called the *Hexapla*, because it consisted of six columns; the first of which contained the Hebrew text; the second, the same text, but written in Greek characters; the third column exhibited the version of Aquila; the fourth, that of Symmachus; the fifth, the Septuagint; and the sixth, the version of Theodotus. In some fragments of that vast work which are still extant, we have a specimen of the manner in which the Hebrew was pronounced in the third century, by which it appears that it was very different from that which results from observing the Masoretic points. The following is an instance copied from the beginning of Genesis.

According to the MASORITES.

Bereshith bara Elohim eth ashamajim veeth aaretz.

Veaaretz ajetha thoou vaboou, vekhoshek gnal penê
theom verouakh elohim merakhepheth gnal penê ham-
mâim.

Vaiômer elohim jehi or, vajehi or.

Vajare elohim eth aor ki tob vajabedel elohim bein
aor oubein hakhoshek.

vowels as late as the arrival of that Colony-chief in Greece. We ought naturally to judge of the Hebrew by the Chaldaic, Syriac, and Arabian, its sister dialects. All these languages in ancient times had their vowels regularly inserted; and why not the Hebrew in the same manner with the rest?

As these first vowels, which were coeval with the other letters, often varied in their sound and application, the points, in all appearance, were first invented and employed to ascertain their different sounds in different connections. Other marks might be invented to point out the various tones of voice, like the *toni*, or accents, with which the vowels were to be enounced, as was done among the later Greeks. In process

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Book i.

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From Ori-
gen's Hex-
apla.

Hebrew Language. process of time, in order to promote celerity of writing, the vowels were omitted, and the points substituted in their place.

Before we conclude our observations on the Hebrew language, we ought, perhaps, to make an apology for omitting to interlard our details with quotations from the two Talmuds, the Mishna, the Gemara, the Cabbalas, and a multitude of rabbinical writers who are commonly cited upon such an occasion. We believe we could have quoted almost numberless passages from the two Buxtorfs, Father Morin, Capellus, and other Hebrew critics, with no great trouble to ourselves, and little emolument to the far greater part of our readers. But our opinion is, that such a pedantic display of philological erudition would probably have excited the mirth of our learned, and roused the indignation of our unlearned, readers. Our wish is to gratify readers of both descriptions, by contributing to the edification of one class without disgusting the other.

We cannot, we imagine, handsomely take leave of the sacred language without giving a brief detail of those excellencies which, in our opinion, give it a just claim to the superiority over those other tongues which have sometimes contended with it for the prize of antiquity: and of these the following in our apprehension deserve particular notice.

38
Excellencies of the Hebrew language.

If this language may claim any advantage over its antagonists, with respect to its being rather a mother than a daughter to any of them, it is undoubtedly in consequence of its simplicity, its purity, its energy, its fecundity of expressions and significations. In all these, notwithstanding its paucity of words, it excels the vast variety of other languages which are its cognate dialects. To these we may add the significancy of the names, both of men and brutes; the nature and properties of the latter of which are more clearly and more fully exhibited by their names in this than in any other tongue hitherto known. Besides, its well authenticated antiquity and the venerable tone of its writings surpass any thing left upon record in any other dialect now extant in the world. These extraordinary qualities excite our admiration at present under every disadvantage; and from this circumstance we may infer its incomparable beauty in the age of the Jewish legislator, and what effects it would naturally produce, could we know it now as it was spoken and written in the days of David and Solomon.

As far, however, as we understand it in its present mutilated condition, and are able to judge of its character from those few books that have come down to our time, we plainly perceive that its genius is simple, primitive, natural, and exactly conformable to the character of those uncultivated patriarchs who used it themselves, and transmitted it to their descendants in its native purity and simplicity. Its words are comparatively few, yet concise and expressive; derived from a very small number of radicals, without the artificial composition of modern languages. No tongue, ancient or modern, can rival it in the happy and rich fecundity of its verbs, resulting from the variety and significancy of its conjugations; which are so admirably arranged and diversified, that by changing a letter or two of the primitive, they express the various modes of acting, suffering, motion, rest, &c. in such a pre-

cise and significant manner, that frequently in one word they convey an idea which, in any other language, would require a tedious paraphrase. These positions might easily be illustrated by numerous examples; but to the Hebrew scholar these would be superfluous, and to the illiterate class neither interesting nor entertaining.

To these we may add the monosyllabic tone of the language, which, by a few prefixes and affixes without affecting the radix, varies the signification almost at pleasure, while the method of affixing the person to the verb exhibits the gender of the object introduced. In the nouns of this language there is no flexion except what is necessary to point out the difference of gender and number. Its cases are distinguished by articles, which are only single letters at the beginning of the word: the pronouns are only single letters affixed; and the prepositions are of the same character prefixed to words. Its words follow one another in an easy and natural arrangement, without intricacy or transposition, without suspending the attention or involving the sense by intricate and artificial periods. All these striking and peculiar excellencies combined, plainly demonstrate the beauty, the stability, and antiquity of the language under consideration.

We would not, however, be thought to insinuate that this tongue continued altogether without changes and imperfections. We admit that many radical words of it were lost in a course of ages, and that foreign ones were substituted in their place. The long sojourning of the Israelites in Egypt, and the close connection with that people, even *quoad sacra*, must have introduced a multitude of Egyptian vocables and phrases into the vulgar dialect at least, which must have gradually incorporated with the written language, and in process of time have become parts of its essence. In Egypt, the Israelites imbibed those principles of idolatry which nothing less than the final extirpation of their polity could eradicate. If that people were so obstinately attached to the Egyptian idolatry, it is not very probable that they would be averse from the Egyptian language. Besides, the Scripture informs us, that there came up out of Egypt *a mixed multitude*; a circumstance which must have infected the Hebrew tongue with the dialect of Egypt. As none of the genuine Hebrew radicals exceed three letters, whatever words exceed that number in their radical state may be justly deemed of foreign extraction.

Some Hebrew critics have thought that verbs constitute the radicals of the whole language; but this opinion appears to us ill founded: for though many Hebrew nouns are undoubtedly derived from verbs, we find at the same time numbers of the latter deduced from the former.

Before we conclude our detail of the Hebrew tongue, a few of our readers may possibly imagine that we ought to give some account of the Hutchinsonian system; a system so highly in vogue not many years ago. But as this allegorical scheme of interpretation is now in a manner exploded, we shall beg leave to remit our curious Hebraist to Mr Holloway's *Originals* a small book in 2 vols 8vo, but replete with multifarious erudition, especially in the Hutchinsonian style and character.—*Fides sit penes autorem.*

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Hutchinsonianism.

Arabic
Language.

SECT. II. *The Arabic Language.*

40
Arabic lan-
guage ori-
ginally He-
brew.

WE now proceed to give some account of the Arabian language, which is evidently one of the sister dialects of the Hebrew. Both, we imagine, were originally the same; the former highly improved and enlarged; the latter, in appearance, retaining its original simplicity and rude aspect, spoken by a people of a genius by no means inventive. In this inquiry, too, as in the former, we shall spare ourselves the trouble of descending to the grammatical minutiae of the tongue; a method which, we are persuaded, would neither gratify our learned nor edify our unlearned readers. To those who are inclined to acquire the first elements of that various, copious, and highly improved tongue, we beg to recommend *Erpenii Rudimenta Ling. Arab. Golii Gram. Arab.* the Dissertations of Hariri, translated by the elder Schultens; Mr Richardson's *Persic and Arabic Gram. &c.*

We have pronounced the Hebrew and Arabian sister dialects; a relation which, as far as we know, has been seldom controverted: but we think there is authentic historical evidence that they were positively one and the same, at a period when the one as well as the other appeared in its infant unadorned simplicity. The following detail will, we hope, fully authenticate the truth of our position.

* Gen. x.
25.

"Unto Eber (says the Scripture *) were born two sons. The name of one was Peleg, because in his days the earth was divided; and his brother's name was Joktan," or rather Yoktan. This last, says the sacred historian, "had thirteen sons; and their dwelling reached from Mesha (Mocha) to Sephar (A)," a mount of the east. According to this account, the descendants of Yoktan possessed all the maritime coast of Arabia from Mesha (Mocha) to mount Sephar towards the east of that peninsula. Moses, describing the rivers of paradise, tells us, that one of the branches of that river † "encompassed the whole land of Havilah, where there was great store of gold." Havilah was the twelfth son of Yoktan, whom the Arabians call Kobtan; and consequently his territory was situated towards the eastern limit of the possessions of the posterity of the youngest son of Eber. Yoktan or Kobtan was too young to be concerned in the building of the tower; and consequently retained the language of his family, which was undoubtedly the Hebrew. His descendants must have carried the same language into their respective settlements, where it must have been transmitted to succeeding generations. The original language of all the tribes of the Arabians who inhabit a vast tract of country along the southern shore, according to this deduction, was that of their father Kobtan, that is, the Hebrew. Indeed, the most learned Arabians of modern times unanimously acknowledge this patriarch as the founder of their language as well as of their nation.

† Gen. ii.
11.

The other districts of Arabia were peopled by the offspring of Abraham. The Ishmaelites, the posterity

of that patriarch by Hagar, penetrated into the very centre of the peninsula; incorporated, and in process of time became one people with the Kobtanites. Another region was possessed by the children of the same holy man by Cheturah his second wife. The Moabites, Ammonites, Edomites, Amalekites, &c. who settled in the various regions of Arabia Petraea, were all branches of Abraham's family, and used the same language with their great progenitor. The Scripture indeed speaks of people who inhabited the country last mentioned prior to the branches of Abraham's family; but these, according to the same history, were extirpated by the former. The conclusion then is, if we credit the Mosaic account, that all the inhabitants of the three divisions of Arabia did, in the earliest periods, universally use the Hebrew tongue.

There was, we are sensible, a region of Arabia inhabited by the Cushim, or descendants of Cush. This district was situated on the confines of Babylonia. Our translators have confounded this country with the modern Ethiopia; and have consequently ascribed the exploits of the Arabian Cushim to the Ethiopians. The Arabian kings of Babylon were of those Cushim. These were conquered and expelled Babylonia by the Chaldeans. These spoke the Chaldean dialect, as will appear when we come to speak of that of the Abyssinians. Here the candid reader is desired to reflect that the Hebrew and Chaldaic are cognate dialects.

The foregoing proofs, deduced from the Mosaic history, will be corroborated by a mass of internal evidence in the succeeding parts of our inquiry.

The Arabic tongue, originally pure Hebrew, was in process of time greatly transformed and altered from its simple unsophisticated state. The Arabians were divided into many different tribes; a circumstance which naturally produced many different dialects. These, however, were not of foreign growth. No foreign enemy ever conquered those independent hords. The Persians, Greeks, and Romans, sometimes attempted to invade their territories; but the roughness of the ground, the scarcity of forage, the penury of water, and their natural bravery, always protected them. They were indeed once invaded by the Abyssinians or Ethiopians with some show of success; but these invaders were in a short time expelled the country. Their language, of consequence, was never adulterated with foreign words or exotic phrases and idioms. Whatever augmentations or improvements it received were derived from the genius and industry of the natives, and not from adventitious or imported acquisitions. From this circumstance we may justly infer, that the Arabian tongue was a long time stationary, and of course differed in no considerable degree from its Hebrew archetype. The learned Schultens, in his Commentary on Job, hath shown, to the conviction of every candid inquirer, that it is impossible to understand that sublime composition without having recourse to the Arabic idioms. That patriarch was a Chuzite. His country might be reckoned a part of Arabia. His three friends were actually Arabians,

(A) Sephar, in the Septuagint Σαφρα, and in some editions Σαφρα: hence probably Σαφρα. Orig. in Job. cap. xxii. ver. 14. παρὰ τῆς τῆς Ερυθραίας Σαφρα τῆς Αφρικανῆς ἐναντίας.

Arabic Language. Arabians, being the descendants of Ishmael and Esau. His country bordered upon that of the predatory Chaldeans, who were an Arabian banditti. When we consider all these circumstances *in cumulo*, we are strongly inclined to believe that the book of Job was actually written in Arabic, as the language stood at that period; which, according to the most probable opinion, could not have been later than the age of Moses. The learned are generally agreed that this whole book, the three first chapters excepted, is a poetical composition, replete with the most brilliant and most magnificent imagery, the boldest, the justest, and most gorgeous tropes and allusions, and a grandeur of sentiment wholly divine. Whoever has read the poetical compositions of the modern Arabians, on divine subjects, with any degree of taste, will, we flatter ourselves, discover a striking similarity both of diction and sentiment. Be this as it may, we think there is no reason to conclude that the Arabic dialect deviated much from the Hebrew standard prior to the Christian era.

42
The two principal dialects of Arabia.

Of those different dialects which prevailed among the various tribes among which the peninsula of Arabia was divided, the principal were the Hemyaret and the Koreish. Though some of these were tributary to the Tobbas, or Hemyaret sovereign of Arabia Felix, yet they took no great pains to cultivate the language of that province, and of course these people did not thoroughly understand it. As for the independent tribes, they had no temptation to cultivate any other language than their own.

The Koreish tribe was the noblest and the most learned of all the western Arabs; and the kaaba, or square temple of Mecca, was before the era of Mohammed solely under their protection. This temple drew annually a great concourse of pilgrims from every Arabian tribe, and indeed from every other country where the Sabian religion prevailed. The language of the Koreish was studied with emulation by the neighbouring tribes. Numbers of the pilgrims were people of the first rank, and possessed all the science peculiar to their country or their age. Great fairs were held during their residence at Mecca, and a variety of gay amusements filled up the intervals of their religious duties. In these entertainments literary compositions bore the highest and most distinguished rank; every man of genius considering not his own reputation alone, but even that of his nation or his tribe, as interested in his success. Poetry and rhetoric were chiefly esteemed and admired; the first being looked upon as highly ornamental, and the other as a necessary accomplishment in the education of every leading man. An assembly at a place called *Ocadh*, had been in consequence established about the end of the sixth century, where all were admitted to a rivalry of genius.

43
The dialect of the Koreish became the politest, and why.

The merits of their respective productions were impartially determined by the assembly at large; and the most approved of their poems, written on silk, in characters of gold, were with much solemnity suspended in the temple as the highest mark of honour which could be conferred on literary merit. These poems were called the *Meallabat*, "suspended," or *Modhabebat*, "golden." Seven of these are still preserved in many European libraries.

From this uncommon attention to promote emula-

tion, and refine their language, the dialect of the Koreish became the purest, the richest, and the most polite, of all the Arabian idioms. It was studied with a kind of predilection; and about the beginning of the seventh century it was the general language of Arabia, the other dialects being either incorporated with it, or sliding gradually into disuse. By this singular idiomatic union the Arabic has acquired a prodigious fecundity; whilst the luxuriance of synonymes, and the equivocal or opposite senses of the same or similar words, hath furnished their writers with a wonderful power of indulging, in the fullest range, their favourite passion for antithesis and quaint allusion. One instance of this we have in the word *veli*; which signifies a prince, a friend, and also a slave. This same word, with the change of one letter only, becomes *vali*; which, without equivocation, imports a sovereign. Examples of this kind occur in almost every page of every Arabic dictionary.

But all those advantages of this incomparable language are merely modern, and do not reach higher than the beginning of the sixth century. Prior to that era, as we have observed above, a variety of dialects obtained; and as the Arabs were by their situation in a manner sequestered from all the rest of mankind, it may not perhaps be superfluous to inquire briefly into the cause and origin of this instantaneous and universal change.

44
This superiority modern.

For a course of more than 20 centuries the Arabians had been shut up within the narrow limits of their own peninsula, and in a great measure secluded from the rest of the world. Their commerce with India was purely mercantile, and little calculated to excite or promote intellectual improvements. They traded with the Egyptians from time immemorial; but since the invasion and usurpation of the pastor kings, every shepherd, that is, every Arabian, was an abomination to the Egyptians. From that quarter, therefore, they could not derive much intellectual improvement. Besides, when an extensive territory is parcelled out among a number of petty sects or clans, the feuds and contests which originate from interfering interests and territorial disputes, leave but little time, and less inclination, for the culture of the mind. In these circumstances, the military art alone will be cultivated, and the profession of arms alone will be deemed honourable. Of consequence, we find that, in the general opinion, poetry, rhetoric, and the profession of arms, were the only sciences cultivated by the people in question. As for the science of arms, we are convinced that it was both studied and practised at a very early period; but as to the two former, we imagine they were very late acquisitions, and sprung from some circumstance external and adventitious.

The tribe of the Koreish were much engaged in commerce. They exported frankincense, myrrh, cassia, galbanum, and other drugs and spices, to Damascus, Tripoli, Palmyra, and other commercial cities of Syria and its neighbourhood. Upon these occasions the Arabian traders must have become acquainted with the Greek language, and perhaps with the more amusing and affecting parts of the Grecian literature. They might hear of the high renown of Homer and Demosthenes; and it is not impossible that some of them might be able to read their compositions. Every body

body knows with what unremitting ardour the learned Arabs, under the first khaliffs, perused and translated the philosophical works of the Grecian sages. The very same spirit might animate their predecessors, though they wanted learning, and perhaps public encouragement, to arouse their exertions. From this quarter, we think, the Arabs may have learned to admire, and then to imitate, the Grecian worthies.

The Ptolemies of Egypt were the professed patrons of commerce as well as of learning. Under these princes all nations were invited to trade with that happy country. The Arabs, now no longer fettered by Egyptian jealousy, carried their precious commodities to Alexandria; where the Grecian literature, though no longer in its meridian splendor, shone however with a clear unfaded lustre. The court of the first Ptolemies was the retreat of all the most celebrated geniuses of Greece and of the age; in a word, Alexandria was the native land of learning and ingenuity. Here the ingenious Arab must have heard the praises of learning incessantly proclaimed; must have been often present at the public exhibitions of the poets and orators; and even though he did not understand them exactly, might be charmed with the melody of the diction, and struck with surprise at their effects on the audience. The reader will please to reflect, that the Arabian traders were the first men of the nation, both with respect to birth, learning, and fortune. These wise men, to use the language of Scripture, inspired with the natural curiosity of their race, might hear of the celebrated Olympic games, the public recitations before that assembly, and the glorious prize bestowed upon the conquerors. Such information might animate them to institute something parallel at Mecca, with a view to improve their language, and at the same time to derive honour and emolument to themselves. The Koreishim might promise themselves the like advantages from the establishment of the fair and assembly at Ocadh, as the natives of Elis drew from the institution of the Olympic games. For these reasons, we conjecture, the literary competitions at the place just mentioned were instituted at so late a period, though the nation had existed more than 2000 years before the establishment of this anniversary. Upon the whole, we are inclined to believe, that the Arabs, notwithstanding all the fine things recorded of them by their own poetical historians, and believed perhaps too easily by those of other countries, were in the days of ignorance like the earliest Romans, *latrones et semibarbari*. For our part, we think it by no means probable, that a people of that character should, after so long a course of years, have stumbled upon so laudable and so beneficial an institution, without taking the hint from some foreign one of a similar complexion. This we acknowledge is only a conjecture, and as such it is submitted to the judgment of the reader.

There were, as has been observed above, two principal dialects of the original Arabic: The Hamyarite spoken by the genuine Arabs, and the Koreishite or pure Arabic, which at last became the general language of that people. The former of these inclined towards the Syriac or Chaldean; the latter being, according to them, the language of Ishmael, was deeply tinged with the Hebrew idiom. The oriental writers tell us

that Terah, the grandfather of Hamyar, was the first whose language deviated from the Syriac to the Arabic. Hence, say they, the Hamyaritic dialect must have approached nearer to the purity of the Syriac, and of consequence must have been more remote from the true genius of the Arabic than that of any of the other tribes. The fact seems to stand thus: The Hamyarites were neighbours to the Chaldeans and Syrians, and consequently were connected with those people by commerce, wars, alliances, &c. This circumstance introduced into their language many phrases and idioms from both these nations. That Terah was concerned in adulterating the dialect of the Hamyarites, is a mere oriental legend, fabricated by the Arabs after they began to peruse the Hebrew Scriptures. The Koreish being situated in the centre of Arabia, were less exposed to intercourse with foreigners, and therefore preserved their language more pure and untainted.

The learned well know, that the Koran was written in the dialect of the Koreish; a circumstance which communicated additional splendor to that branch of the Arabian tongue. It has been proved, that the language of the original inhabitants of Arabia was genuine Hebrew; but upon this supposition a question will arise, namely, whether the Arabians actually preserved their original tongue pure and unsophisticated during a space of 3000 years, which elapsed between the deluge and the birth of Mohammed? or, whether, during that period, according to the ordinary course of human affairs, it underwent many changes and deviations from the original standard?

The admirers of that language strenuously maintain the former position; others, who are more moderate in their attachment, are disposed to admit the latter. Chardin observes of the oriental languages in general, that they do not vary and fluctuate with time like the European tongues. "Ce qu'il y a de plus admirable, dit il, et de plus remarquable, dans ces langues, c'est, qu'elles ne changent point, et n'ont point changé du tout, soit à l'égard de termes, soit à l'égard du tour: rien n'y est, ni nouveau ni vieux, nulle bonne façon de parler, n'a cessé d'être en credit. L'Alcoran, par exemple, est aujourd'hui, comme il y a mille années, le modele de plus pure, plus courte, et plus éloquente diction." It is not to our purpose to transcribe the remaining part of the author's reflection upon this subject: From the above it plainly appears that he concludes, that the Arabian tongue has suffered no change since the publication of the Koran; and at the same time insinuates, that it had continued invariable in its original purity through all ages, from the days of Kobtan to the appearance of that book. Whether both or either of these sentiments is properly authenticated will appear in the sequel.

The learned Dr Robertson, professor of oriental languages in the university of Edinburgh, informs us, that the Arabians, in order to preserve the purity of their language, strictly prohibited their merchants, who were obliged to go abroad for the sake of commerce, all commerce with strange women. We know not where this injunction is recorded, but certainly it was a most terrible interdict to an amorous son of the desert. If such a prohibition actually existed, we suspect it originated from some other source than the fear of corrupting their language. Be that as it may, the Doc-

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Language.

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The Koran
written in
the Koreish
dialect.

45

Institution
at Mecca
similar to
the Olym-
pic games.

47

Means a-
dopted by
the Arabs
to preserve
the purity
of their lan-
guage.

Arabic
Language.

tor, as well as the great Schultens, is clearly of opinion, that the language in question, though divided into a great number of streams and canals, still flowed pure and limpid in its course.

48
The style
of the Ko-
ran now
obsolete,

Our readers who are acquainted with the history of the orientals are already apprized of the steady attachment of those people to ancient customs and institutions. We readily allow, that in the article of Language this same predilection is abundantly obvious; but every oriental scholar must confess, that the style of the Koran is at this day in a manner obsolete, and become almost a dead language. This fact, we believe, will not be questioned. If the Arabian has deviated so very considerably from the standard of the Koran in little more than 1000 years, and that too after an archæpe is ascertained; by a parity of reason we may infer, that much greater deviations must have affected the language in the space of 3000 years.

It is universally allowed by such as maintain the unfulfilled purity of the Arabian tongue, that it was originally the same with the Hebrew, or with the ancient Syriac and Chaldaic. Let any one now compare the words, idioms, and phraseology of the Koran with the remains of those three languages, and we think we may venture to affirm that the difference will be palpable. This circumstance, one would think, indicates in the strongest terms a remarkable alteration.

The Arabs themselves are agreed, that, notwithstanding the amazing fecundity of their language, vast numbers of its radical terms have been irrecoverably lost. But this loss could not be supplied without either fabricating new words or borrowing them from foreign languages. To the latter method we have seen their aversion; and must therefore conclude that they adopted the former.

The Chaldeans, Syrians, and Phœnicians, had made innovations on their language at a very early period, even before conquests were undertaken: We see no reason to suppose that the Arabs did not innovate as well as their nearest neighbours; the Hamyarites did actually innovate.

49
And re-
sembling
the He-
brew in its
phraseolo-
gy.

There are, we think, very strong reasons to believe, that Job was an Arabian, and flourished prior to Moses, perhaps as early as Jacob. The style, the genius, the figurative tone of the composition; the amazing sublimity of the sentiments, the allusions, the pathos, the boldness, the variety, and irregularity; the poetical enthusiasm which pervade the whole poem, strongly breathe the Arabian spirit: indeed the very diction is peculiar to that single book, and differs widely from that of the Psalms and every poetical part of the sacred canon. If we compare this book with Mohammed's Koran, we shall scarce find any resemblance of words or phraseology; but a wonderful similarity of figures, enthusiasm, and elevation of sentiments.

We are then led to conclude, that the Arabic did actually lose and gain a multitude of vocables between the era of its first establishment among the descendants of Joktan and Ishmael and the birth of the impostor.

The art of writing was introduced among the Arabs at a very late period: Without the assistance of this art, one would think it altogether impossible to preserve any language in its primæval purity and simplicity. Our curious readers may here expect some ac-

count of the Arabic characters: the following detail is the most probable one we have been able to collect on that subject.

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Language.

It is generally agreed*, that the art of writing was known among the Hamyarites or Homerites at a very early period. These people were sovereigns of Arabia during a course of many ages. Their character was somewhat perplexed and confused. It was called *Mofnad*, from the mutual connection of the letters. The alphabet of these people resembled that of the Hebrews both in the number and order of the letters, and is called *abgad bevix* †, from the first ten letters of the Hebrew alphabet, artificially thrown together. "And this word (says the learned Chardin ‡) *a, b, g, d*, is formed of the four letters which were heretofore the first in the Arabian language, as they are still in that of the Hebrews." The same traveller is positive that these were the ancient characters of the Arabs; that they differed from Cuphite letters, which were afterwards introduced; and that they were furnished with vowel points. These, we imagine, were the first rude sketches of the Chaldean character, which probably the Hamyarites retained in their pristine unpollished form, after they had been polished and reduced to a more elegant size by the original inventors.

Monuments bearing inscriptions in these characters are, they tell us, still to be seen in some places of Arabia. Some were engraved on rocks; and to these we think it probable that the patriarch Job alludes in those passages where he seems to intimate an inclination to have his sufferings recorded in a book, and graven in the rock for ever. All the Arabians agree, that the dialect of the Hamyarites inclined towards the Syriac or Chaldean. This we have imputed to the connection of that people with the Chaldeans, who lived in their neighbourhood. If the Hamyaritic dialect was infected with the Syriac or Chaldaic, there can be no doubt that they derived their letters from the same quarter.

We conclude then, that the Hamyarites knew the art of writing from the earliest antiquity, and that the letters they employed were the rude Chaldaic in their unimproved state ||. Some of the Arabians do indeed hold, that Ishmael was the first author of letters; but that his characters were rude and indistinct, without any interval between letters or words, and that these were adopted by Kedar and his other children: but this tradition hath met with little credit.

With respect to the highly polished Koreishites, it is agreed on all hands, that they were unacquainted with the use of letters till a few years before the birth of Mohammed. Two difficulties here present themselves. The first is, how the Koreishite dialect, without the art of writing, happened to excel all the other dialects of the Arabic tongue, assisted by that art, apparently so necessary for preserving a language in its original purity. The second is still, we think, rather greater, namely, how the Koreish learned that most useful art at so late a period as the sixth century. It is a well known fact, that ever after the Babylonish captivity Arabia swarmed with Jewish villages, in which the art of writing was generally known; and almost at the beginning of the Christian era, multitudes of Christians retired to the same country, in order to avoid the persecutions which they suffered in the Roman empire. In these circumstances, we think it rather

51
In Chaldaic
characters.

|| Pococke
Orat. de
Ling. Arab.

52
Art of writing
among
the Korei-
shites.

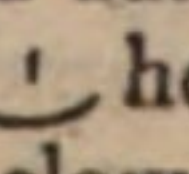
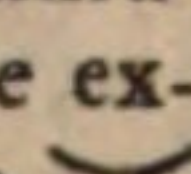
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Language.

ther strange, that the Koreishites, highly polished and acute as they were, never thought of laying hold on the opportunity of learning an art so very useful. These two problems we leave to be solved by our more learned readers.

But however they be solved, it is universally acknowledged, that the Koreish were ignorant of letters till a few years before the birth of their prophet. Ebn Chalican (b), one of their most celebrated historians, informs us, that Moramer the son of Morra, an Anbarian, a native of Anbaris, a city of Irak (c), first invented alphabetical characters, and taught his countrymen to use them, from whom this noble invention was derived to the Koreishites. These letters, though neither beautiful nor convenient, were long used by the Arabs. They were denominated *Cuphite*, from *Cupha* a city of Irak. In this character the original copy of the Koran was written. These we think were the original clumsy characters which were retained by the vulgar after the beautiful square Chaldaic letters were invented; and probably used by priests, philosophers, and the learned in general. These letters are often at this day used by the Arabs for the titles of books and public inscriptions.

* Robert
Clav. Pent.
p. 35, 36.
53
Improved
about 300
years after
Moham-
med.

Abauli the son of Mocla*, about 300 years after the death of Mohammed, found out a more elegant and more expeditious character. This invention of Abauli was afterwards carried to perfection by Ebn Bowla, who died in the year of the hegira 413, when Kader was caliph of Bagdad. This character, with little variation, obtains at this day. As we think this article of some importance, we shall, for the sake of our unlearned readers, transcribe an excellent account of this whole matter from the very learned Schultens.

"The Cuphic characters, says he, which had been brought from the region of the Chaldeans to the province of Hejaz, and to Mecca its capital, in the age of Mohammed, was employed by the Koreishites, and in it the koran was first written. But as this character was rude and clumsy, in consequence of its size, and ill calculated for expedition, Abauli Ebn Mocla devised a more elegant and expeditious one. This person was visir to Arradius the 41st caliph, who began to reign in the year of the hegira 322. Accordingly, in the 10th century, under this emperor of the Saracens, the form of the Arabian alphabet underwent a change; and the former clumsy embarrassed character was made to give way to the polished, easy, and expeditious type. Regarding this expedition alone, the author of the invention left very few vowel characters; and as the Hebrew manner of writing admits five long ones and five short in different shapes, he taught how to express all the vowels, both long and short, suitably to the genius of the language, by three, or rather by two, small points, without any danger of a mistake: an abbreviation truly deserving applause and admiration; for by placing a very small line above  he expressed *a* and *e*; and by placing the same below  he meant to intimate *i* only. To the other short

ones, *o* and *u*, he assigned a small *waw* above. In order to represent the long ones, he called in the *matres lectionis*, the "quiescent letters *u, l, k*;" so that *phata* with *elif* intimated *a* and *o* long, *i. e.* *kametz* and *cholem*; *jod* placed after *kefram* became *tzeri* and *chirek* long. *Waw* annexed to *damma* made *schurek*."

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In this passage, this great orientalist acknowledges that the visir above-mentioned, who carried the Arabian alphabet to the pinnacle of perfection, invented and annexed the vowel points for the sake of ease and expedition in writing; from which we may infer, that prior to the tenth century the Arabians had no vowel points; and consequently either read without vowels, or contented themselves with the *matres lectionis* above-mentioned.

The design of the author of the invention in fabricating these points, was confessedly ease and expedition in writing; a circumstance which furnishes a violent presumption that the Hebrew vowel-points were devised and annexed at some late period for the very same purposes.

Some, indeed, have gone so far as to affirm that the Arabians were the original fabricators of the vowel-points. "The Arabians§ (says the learned Dr Gregory Sharp) were the original authors of the vowel-points. They invented three, called *fatha*, and *damma*, and *kefra*: but these were not in use till several years after Mohammed; for it is certain that the first copies of the koran were without them. The rabbis stole them from the Arabs." This, however, is carrying the matter too far, since it is certain that the Jews were acquainted with the points in question long before the period above-mentioned.

§ Diff. on
the Origin
and Const. of
Lang. &c.

Though it is none of our intention to enter into a minute detail of the peculiarities of this noble language, we cannot omit observing one thing, which indeed belongs to grammar, but is not generally taken notice of by the Arabic grammarians. The roots of verbs in this dialect are universally trilateral; so that the composition of the 28 Arabian letters would give near 22,000 elements of the language. This circumstance demonstrates the surprising extent of it: for although great numbers of its roots are irrecoverably lost, and some perhaps were never in use; yet if we suppose 10,000 of them, without reckoning quadrilaterals to exist, and each of them to admit only five variations, one with another, in forming derivative nouns, the whole language would then consist of 50,000 words, each of which may receive a multitude of changes by the rules of grammar.

54
Surprising
extent of
the Arabic
language.

Again, the Arabic seems to abhor the composition of words, and invariably expresses very complex ideas by circumlocution; so that if a compound word be found in any dialect of that language, we may at once pronounce it of foreign extraction. This is indeed a distinguishing feature in the structure of this tongue, as well as of some of its sister dialects. This circumstance has, in our opinion, contributed not a little to the amazing fecundity of that language: for as every ingredient in the composition of a complex idea requires

a.

(b) See this whole detail in Dr Pocock's *Specim. Hist. Arab.* p. 250. et seq.

(c) *Irak*, "Babylonia," from *Erech*, one of the cities built by Nimrod. The Arabians have generally restored the ancient names of places. Thus with them Tyre is *Tzur*, Sidon *Seyd*, Egypt *Mezri*, &c.

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Language.

a word to express it, as many words became necessary to complete the language as there were simple ideas to be intimated by discourse. Were all the compounds of the Greek language to be dissolved, as probably once they were, the vocables of that tongue would infinitely exceed their present number.

* Pocock's
Specimen.

The Arabic authors boast most unconscionably of the richness and variety of their language. No human understanding, say they, is capacious enough to comprehend all its treasures. Inspiration alone can qualify one for exhausting its sources *. Ebn Chalawalb, a most renowned grammarian of theirs, has spent a whole volume upon the various names of the lion, which amount to 500; another on the names of the serpent, which make up 200. Mohammed al Firancabodius affirms that he wrote a book on the usefulness and different denominations of honey, in which he enumerates 80 of them; and after all, he assures us that he was still far from having exhausted his subject. To excel in a language so amazingly copious, was certainly a proof of uncommon capacity, and considered as no mean talent even among the Koreishites. Hence Mohammed, when some people were expressing their admiration of the eloquence of the koran, told them that he had been taught by the angel Gabriel the language of Ishmael, which had fallen into desuetude.

55
Oratory
and poetry
of the
Arabs.

In a language so richly replenished with the choicest and most energetic terms, both oratory and poetry were cultivated with ease. All the difficulty consisted in making a choice among words and phrases equally elegant. We may compare one of those poets or orators to a young gentleman, of a taste highly refined, walking into a repository where a profusion of the richest and most elegant dresses are piled up in wild confusion. Our beau is here distressed with variety; but to be able to choose the most handsome and most becoming, he must have received from nature a superior good taste; which he must likewise have cultivated by assiduous industry, and by associating with the most genteel company.

The orations of the Arabs were of two kinds, metrical and prosaic. The former they compared to pearls set in gold, and the latter to loose ones. They were ambitious of excelling in both; and whoever did so, was highly distinguished. His success in either of those departments was thought to confer honour, not only on his family, but even on his tribe. In their poems were preserved the genealogies of their families, the privileges of their tribes, the memory of their heroes, the exploits of their ancestors, the propriety of their language, the magnificence of banquets, the generosity of their wealthy chiefs and great men, &c. After all, we cannot avoid being of the unpopular opinion, that this mighty parade of eloquence and poetry did not reach backward above two centuries before the birth of Mohammed, as it certainly vanished at the era of the propagation of his religious institutions. The two succeeding centuries were the reigns of superstition and bloodshed. The voice of the muses is seldom heard amidst the din of arms.

The ancient Arabs, at whatever time poetry began to be in request among them, did not at first write poems of considerable length. They only expressed themselves in metre occasionally, in acute rather than harmonious strains. The Proverbs of Solomon, and

the book of Ecclesiastes seem to be composed in this species of versification. The prosody of the Arabs was never digested into rules till some time after the death of Mohammed; and this is said to have been done by Al Khalti al Farabidi, who lived in the reign of the caliph Karan of Raschid.

After so many encomiums on the copiousness of the Arabic tongue, one class of our readers may possibly expect that we should subjoin a brief detail of its genius and character; and this we shall do with all possible brevity.

56
Genius and
character
of the lan-
guage.

All the primary or radical words of the language are composed of different combinations of consonants by triads; so that the various combinations and conjunctions of radicals make more than 10,000, even without including those which may arise from the meeting of guttural letters. From this quality of the language has flowed that stability of the dialect which has preserved it pure and entire for so many thousand years, and secured it from those changes and that fluctuation to which most other tongues are subject.

Perhaps, notwithstanding its copiousness and variety, no other language can vie with the one in question in point of perspicuity and precision. It is possessed of a brevity and rotundity which, amidst the greatest variety, enables it to express with clearness and energy what could not be expressed in any other tongue without tedious circumlocutions. To this purpose we shall beg leave to transcribe a passage from Bishop Pocock's oration on the Arabic language. As we imagine few of our readers who will have the curiosity to peruse this article can be unacquainted with the Latin tongue, we shall give it as it stands in the original, without a translation:

"Neque in nulla certe laudis parte, mira illa qua, non solum verborum in significando, perspicuitate, sed in prolatione, elegantia et dulcedini caverunt, sedulitas; quoque, non solum accurata, inter literas ex significata proportionem, sensus vel intensiōi, vel remissioni, prout res postulaverit, literarum appositione, subductione, vel juxta organorum, rationem prospexerunt; sed et ne quid delicatulis auribus ingratis, ne quid horridum, aut ασυμμετρον, reperiatur, effecerunt. Hoc in genere est, quod nuspian in verbo aliquo, genuinae apud Arabes originis, concurrunt, non intercedente vocalis alicujus motione consonantes, cum vel tres, vel plures, aliis in linguis frequenter colliduntur. Immo neque, si adsint, quae asperitati remedio sint, vocales, quas libet temere tamen committunt consonantes; sed ita rei natura postulat, ut concurrere debeant illae, quae se invicem, sine asperitatis inductione consequi, et inter se connecti non possint; illi vel situs, vel literarum mutatione, eas abjiciendo, inferendo, emolliendo, aliisve quibus possent modis, remedia quaerunt; adeo ab omni, quod vel absonum, vel dissonum est, abhorrent. Quod si nobis secus videntur, et asperius sonare ab Arabibus prolata, illud auribus nostris, et usui, non linguae imputandum, nec mollius illis sonare nostra, quam eorum nobis censendum. Quin et gutturalium, quae nobis maxima asperitatis causa videntur, absentiam, ut magnum in lingua Graeca defectum, arguunt Arabes."

The learned Dr Hunt, late professor of the Hebrew and Arabic languages at Oxford, is of the same opinion with the very learned prelate, part of whose oration

Arabic
Language.

tion we have transcribed above, with respect to the delicacy and elegance of the Arabian language:—"Nusquam, mihi credite, (inquit ille) auribus magis parcitur quam in Arabia; nulla lingua a *ἡεροφωνία*, alienior quam Arabica. Quamquam enim nonnullæ ejus literæ minus fortasse suaviter, immo durius etiam sonuerint, ita tamen Arabes eas temperarunt cum lenibus, duras cum mollibus, graves cum acutis miscendo, voces inde non minus auribus jucundæ, quam pronuntiatio faciles confecerint, totique sermoni miram sonorum tam dulcedinem quam varietatem addiderint. Quod quidem orationis modulandæ studium in Corano adeo manifestum est, ut primi Islamismi oppugnatores eum librum magica, ideo arte scriptum dixerint. Non auribus tantum gratus est Arabismus, sed et animi conceptibus exprimendis aptus, sonos suos sententiis semper accommodans, et felici verborum junctura eorum naturam depingens."

To these we might add quotations from Erpenius's oration on the same subject, from Golius, Schultens, Hottinger, Bochart, and Sir William Jones; besides a whole cloud of oriental witnesses, whose extravagant encomiums would rather astonish than edify the far greater part of our readers. These panegyrics may perhaps be in some measure hyperbolical; but in general we believe them pretty well founded. At the same time we are convinced that the Arabic, however melodious in the ears of a native, sounds harsh and unharmonious in that of a European.

57
Difficulty
of acquiring
a thorough
knowledge
of it.

When we consider the richness and variety of the Arabic tongue, we are led to conclude, that to acquire a tolerable degree of skill in its idioms, is a more difficult task than is generally imagined; at least some people who have acquired the knowledge of the Greek and Latin, and likewise of the more fashionable modern languages, with facility enough, have found it so. Be that as it may, there are two classes of men who, in our opinion, cannot handsomely dispense with the knowledge of that almost universal tongue: the gentleman, who is to be employed in the political transactions of the most respectable mercantile company upon earth, in the eastern parts of the world; and the divine, who applies himself to investigate the true purport of the sacred oracles: without this, the former will often find himself embarrassed in both his civil and mercantile negotiations; and the latter will often grope in the dark, when a moderate acquaintance with that tongue would make all sunshine around him.

Bochart, Hottinger, Schultens, Pocock, Hunt, and Robertson, &c. have taken wonderful pains, and lavished a profusion of learning, in proving the affinity and dialectical cognation between the Hebrew and Arabic. Much of this labour, we think, might have been spared. We presume to affirm, that no person tolerably versed in both languages can read a single paragraph of the Arabic version of the New Testament, or indeed of the Koran itself, without being convinced of the truth of this position: it is but stripping the latter of its adventitious frippery, and the kindred features will immediately appear.

The learned professors of the university of Leyden were the first who entered upon the career of Arabian learning. To them the European students are prin-

cipally indebted for what knowledge of that language they have hitherto been able to attain. Though several Italians have contributed their endeavours, yet the fruit of their labours has been rendered almost useless by more commodious and more accurate works printed in Holland.

Chaldean
Language,
&c.

The palm of glory, in this branch of literature, is due to Golius, whose works are equally profound and elegant; so perspicuous in method, that they may always be consulted without fatigue, and read without languor. Erpenius's excellent grammar, and his memorable dictionary, will enable the student to explain the history of *Taimur* by *Ibni Arabshah*. If he has once mastered that sublime work, he will understand the learned Arabic better than most of the Khatabs of Constantinople or of Mecca.

The Arabian language, however, notwithstanding all its boasted perfections, has undoubtedly shared the fate of other living languages; it has gradually undergone such considerable alterations, that the Arabic spoke and written in the age of Mohammed may be now regarded as a dead language: it is indeed so widely different from the modern language of Arabia, that it is taught and studied in the college of Mecca just as the Latin is at Rome.

The dialect of the Highlands of Yemen is said to have the nearest analogy to the language of the Koran, because these Highlanders have little intercourse with strangers. The old Arabic is through all the East, like the Latin in Europe, a learned tongue, taught in colleges, and only to be acquired by the perusal of the best authors.

"*Ut folia in sylvis pronos mutantur in annos, &c.*"

SECT. III. Of the Chaldean, Phœnician, Ethiopian or Abyssinian, and Egyptian Languages.

As there is a very strict connection and dialectical analogy among these languages, we have arranged them all under one section; especially since what is observed relating to one of them may, without the least straining, be extended to them all. We shall begin with the Chaldaic.

58
Connection
of the
Chaldean,
Phœnician,
Ethiopic,
and Egyptian
languages

The Chaldeans, or Chasidim, as they are always called in Scripture, were the descendants of Chesed the son of Nahor, the brother of Abraham. The descendants of this patriarch drove the Cushim or Arabians out of Babylonia, and possessed themselves of that country at a very early period. As these Chasidim or Chaldeans were the posterity of Nahor, the descendant of Heber, they undoubtedly spoke the original Hebrew tongue as well as the other branches of that family. But being an ingenious inventive people, they seem to have polished their language with much care and delicacy of taste.

The only genuine remains of the ancient Chaldaic language are to be found in the Hebrew Scriptures; and those are contained in 268 verses, of which we have 200 in Daniel, reaching from verse 4th chapter 2d to chapter 8th exclusive; in Ezra 67, in chapter 4th, 17 verses; chapter 5th, the same number; chapter 6th, 18 verses; and in chapter 7th, 15: in Jeremiah, chapter 10th, there is extant only one verse. From these fragments, compared with the Hebrew

Chaldean Language, &c. brew, it plainly appears, that the difference between that language and the Chaldaic is scarce equal to that between the Doric and Ionic dialects of the Greek.

Whatever might have been the form of the most ancient Chaldaic letters, it is generally known that the beautiful square characters, in which the Hebrew Scriptures began to be written after the age of Ezra, were current among them at an era prior to the Babylonish captivity. Those elegant characters were probably the invention of the Chaldean academies, which were established in various parts of that extensive and fertile country.

59
Chaldean differs little from the Hebrew.

The Chaldean declensions and conjugations differ so little from the Hebrew modifications, that it would be almost superfluous to dwell upon them in this section. The most effectual way to acquire an idea of the ancient Chaldaic, is to decompound the names confessedly of that dialect, which occur in many places of Scripture. By this method of proceeding, its beautiful structure and expressive energy will be readily comprehended even by the most illiterate classes of our readers. At the same time, we must observe, that the Chaldaic and ancient Syriac bore so near a resemblance to each other, that they have generally been classed under one head.

The first Chaldaic word that occurs in the Old Testament is *bara* "creavit". This word has all along been assigned to the language under consideration; for what reason, we confess we are not able to discover. The greatest part of the Hebrew tongue is now lost. The words *bar*, "a son," and *bara* "creavit," (rather *filii*), may probably be of that number. Another Scripture word which is often quoted, and always ascribed either to the Syriac or Chaldaic, is *igar* or *jegar sabadutha*, which signifies "a monument of witnesses." Every body knows, that when Jacob and Laban made their compact, the latter denominated the heap of stones reared upon that occasion in this manner; while the former called it *Galeed*, as we now write and pronounce it. This pronunciation, however, does not appear to us altogether genuine. The word is probably compounded of *gal*, *cumulus*, "a heap," and *chad*, *eternitas*, *seculum*, "eternity, an age:" so that *galchad*, or *galaad* as it came to be written afterwards, signified an "everlasting heap." Laban then had respect to the end for which the monument was erected; but Jacob alluded to its duration. It appears, however, upon this and every other occasion, when Chaldaic words are mentioned, that *al*, *a*, was a favourite letter both with the Syrians and Chaldeans. We may likewise observe, that the same people always changed the Hebrew *shin* into *thau*, in order to avoid the serpentine sound of that consonant.

60
Its proper names pure Hebrew.

The Chaldaic names of gods, men, places, &c. which occur in Scripture, appear to be no other than Hebrew polished and improved. *Bel*, *Belus* in Latin, is evidently *Baal*, or we think rather *Bechel*. The Phœnicians, and sometimes the Hebrews, used it to signify the most high. The Chaldeans used their word *Bel* for the same purpose; and because this word originally imported the *High One*, they dignified their first monarch with that name. They denominated their capital city *Ba-Bel*, which imports the temple of *Bel*, and afterwards *Babylon*, which intimates the abode or dwelling of our lord the sun. *Nebo* was a name of the

moon among the Babylonians, derived from the Hebrew *nabab*, *vaticinari*, "to prophecy." *Azer* was the planet Mars, from *azur*, *accinxit*, "to gird," alluding to the girding on of arms. *Abad* was an Assyrian name of the sun*, a word deduced from the Hebrew *abad*, *unus*, "one." *Netzar* was the name of an Arabian idol†, which often occurs in the composition of Babylonian names. In Arabic it signifies an eagle: we think, however, that the word is the Hebrew *natzar*, *custodivit*, *servavit*, "to keep, to preserve." To these names of deities many more might be added, which the nature of our design will not allow us to mention.

Chaldean Language, &c.

* Merob. lib. i. c. 23.
† Pococke Specim. Hist. Arab.

Almost all the Chaldean proper names which occur either in sacred or prophane history are evidently of Hebrew original, or cognate with that language. We shall subjoin a few examples: *Nabonassar* is evidently compounded of *Nabo* and *nazur*, both Hebrew words. *Nabopolassar* is made up of *Nabo-Pul*, the same with *Bel*, and *Azer* or *Azor*, above explained. *Belefsis* is made up of *Bel* and *Efsa*, "fire." *Nebuchadnezzar*, *Belshazzar*, *Beltishazzar*, *Neriglissar*, *Nebuzaradan*, *Rabmag*, *Rabfarris*, *Nergal-Sharezer*, *Rabshakeh*, *Ezrahaddon*, *Merodach*, *Evil Merodach*, and numberless others, are so manifestly reducible to Hebrew vocables, when decompounded; that the oriental scholar will readily distinguish them.

Names of places in the Chaldaic are likewise so nearly Hebrew, that nothing but the dialectical tone separates them. Thus *Ur* of the Chaldeans is actually *light*, that city being sacred to the sun; *Sippora* is plainly the Hebrew word *Zipporah*; *Garchemish*, a city on the Euphrates, is evidently compounded of *Kir* or *Kar* "a city," and *Chemosh*, a name of the sun. In short, every Chaldean or old Syrian word now extant, without any difficulty, bewray their Hebrew original. As for their dialectical differences, these we remit to the Chaldaic and Syriac grammars and lexicons.

We now proceed to the consideration of the Phœnician language, which is known to have been that of the ancient Canaanites. That this was one of the original dialects, and consequently a cognate of the Hebrew, is universally acknowledged. Instead therefore of endeavouring to prove this position, we may refer our readers to the works of the learned Mr Bochart, where that author has in a manner demonstrated this point, by deriving almost all the names of the Phœnician colonies from the Hebrew, upon the supposition that the dialect of those people was closely connected with that tongue. St Augustine, *de Civitate Dei*, has observed, that even in his time many of the vulgar in the neighbourhood of Carthage and Hippo spoke a dialect of the old Punic which nearly resembled the Hebrew. Procopius, *de bello Goth.* informs us, that there existed even in his days in Africa a pillar with this inscription in Hebrew, "We flee from the face of Joshua the robber, the son of Nun." The names of all the ancient cities built by the Carthaginians on the coast of Africa are easily reducible to a Hebrew original. The Carthaginian names of persons mentioned in the Greek and Latin history, such as Himilco, Hamilcar, Asdrubal, Hannibal, Hanno, Dido, Anna or Hannah, Sophonisba, Gisgo, Maharbal, Adherbal, &c. all breathe a Hebrew extraction.

61
Phœnician language derived from the Hebrew.

The Greeks borrowed a great part of their religious worship from the people of whose language we are treating; of consequence, the names of most of their gods are Phœnician. Almost every one of these is actually Hebrew, as might easily be shown. The names of persons and places mentioned in the fragments of Sanchoniathon, preserved by Eusebius, are all of Hebrew complexion. The names mentioned in the Hebrew scriptures of places which belonged to the Canaanites prior to the invasion of the Israelites under Joshua, are as much Hebrew as those which were afterwards substituted in their stead. The Punic scene in Plautus has been analysed by Bochart and several other learned men, by whom the language has been clearly proved to be deduced from the Hebrew, with some dialectical variations.

The island of Malta (Melita now) was inhabited by a colony of Phœnicians many ages before the Moors took possession of it. Among the vulgar of that island many Punic vocables are current to this day, all which may be readily traced up to the Hebrew fountain. To these we may add many inscriptions on stones, coins, medals, &c. which are certainly Phœnician, and as certainly of Hebrew extraction. We have thrown together these few hints without pursuing them to any great length, as we deemed it unnecessary to dwell long on a point so hackneyed and so generally acknowledged.

62
Origin of
the Ethiopians.

Before we proceed to treat of the ancient language of the Ethiopians, we find ourselves obliged to hazard a few strictures on the origin of that ancient nation. If we can once settle that single point, the discovery will open an avenue to their primitive dialect, the article about which we are chiefly concerned in the present discussion.

In our Section concerning the Hebrew language, we were led often to mention the patriarch Cush the eldest son of Ham. The posterity of this family-chief, under his son Nimrod, possessed themselves of Shinar, afterwards denominated *Chaldea*. These were probably the Arabians whose kings (according to Eusebius, Africanus, and other ancient chronologers) reigned in Babylon during several successive generations. Those were the Cushim or Cushites, whom the learned Mr Bryant has conducted over a great part of the world, and to whose industry and ingenuity he has ascribed almost all the inventions, arts, sciences, laws, policy, religions, &c. which distinguished mankind in the earliest ages.

In process of time, the posterity of Chafid or Chafidim, called *Chafdim* or *Chafidim* in the east, and *Chaldeans* in the west, drove out the Cushim, and seized upon their country. The Cushim retired westward, and spread themselves over that part of Arabia situated towards the south-east. They probably extended themselves over all the eastern part of that peninsula from the sea to the wilderness between Arabia and Syria. Those were the Ethiopians mentioned in Scripture by a very unpardonable inadvertency of our trans-

lators. These, then, we think, were the primitive Cushim. Chaldean Language, &c.

Josephus informs us*, that all the Asiatics called the Ethiopians of Africa by the name of *Cushim*. This denomination was not given them without good reason: it imports at least, that they deemed them the descendants of Cush; it being the constant practice of the orientals in the early ages to denominate nations and tribes from the name of their great patriarch or founder. The name *Cushim* must then have been given to the Ethiopians, from a persuasion that they were the progeny of the son of Ham who bore that name. By what route soever the Cushim penetrated into that region of Africa which was called by their name, it may be taken for granted that they were the descendants of Cush above mentioned. Antiq. Jud. lib. 1. c. 7.

It has been observed above, that the posterity of Cush possessed the country of Shinar or Chaldea at a very early period, but were expelled by the Chafidim or Chaldeans. Upon this catastrophe, or perhaps somewhat later, a colony from the fugitive Cushim transported themselves from the south and south-east coast of Arabia over the sea, which lies between that country and Ethiopia. However imperfect the art of navigation might be in that age, the distance was so small that they might easily enough make a voyage across that narrow sea in open boats, or perhaps in canoes. However that may have been, it cannot be doubted that the tribes on both sides of that branch of the sea were kindred nations.

If, then, both the northern and southern Cushim sprung from the same stock, there can be no doubt that both spoke the same language. The language of the Babylonian Cushim was Chaldaic, and of consequence that of the Ethiopian Cushim was the same. We may therefore rest assured, that whatever changes the Ethiopian dialect may have undergone in the course of 3000 years, it was originally either Chaldaic, or at least a branch of that language. Scaliger informs us, that the Ethiopians call themselves Chaldeans; and that, says he, not without reason, because of those many sacred and profane books which are extant among them, the most elegant and most beautiful are written in a style near that of the Chaldean or Assyrian. Marianus Victorius, who was the first that reduced the Ethiopic tongue to the rules of grammar, tells us in his *Proæmium*, "that the Ethiopians call their tongue Chaldaic; that it springs from the Babylonian; and is very like the Hebrew, Syriac, and Arabic: At the same time (he concludes), that this language may be easily learned by those who are masters of the Hebrew." The learned Bochart, and Bishop Walton in his *Proleg.* are clearly of the same opinion. 63
Their language originally Chaldean.

The vulgar letters of the Ethiopians, according to Diodorus Siculus, were the same with the sacred characters of the Egyptians (D). From this account, if the Sicilian may be trusted, the sacred letters of these people, concerning which so many wise conjectures

(D) We find the same observation confirmed by Heliodorus (*Ethiop. lib. x. p. 476.*) "The royal letters of the Ethiopians (says he) were the sacred characters of the Egyptians." Cassiodorus likewise assures us, "That the letters inscribed upon the Egyptian obelisks were Chaldeans." See Sect. *Shanscrit.*

Chaldean Language, &c. tures have been formed, were actually Chaldaic. To carry on this investigation a little farther, we may observe, that Sir William Jones seems to have proved, by very plausible arguments, that the Sanscrit characters were deduced from the Chaldaic. This circumstance affords a presumption that the Ethiopian Cushim were likewise concerned with the Egyptians; who, as is remarked in the Section concerning the *Sanscrit*, probably introduced the religion of the Brahmans into Hindostan. This is advanced as a conjecture only; and yet when we consider the affinity between the Egyptian and Gentoo religions, we are strongly inclined to hope that this surmise may one day be verified by undeniable facts.

64 Antient intercourse between the Ethiopians and Egyptians. The original Ethiopians were a people highly civilized; their laws, their institutions, and especially their religion, were celebrated far and wide. Homer talks in raptures of the piety of the Ethiopians, and sends his gods every now and then to revel 12 days with that devout people. The Sicilian adduces a number of very specious arguments to prove that these two nations had sprung from the same stock. He mentions a similarity of features, of manners, of customs, of laws, of letters, of the fabrication of statues, of religion, as evidences of the relation between those two neighbouring nations. There was, every body knows, a communion, as to sacred rites, between the two countries. The Egyptians sent annually a deputation of their priests, furnished with the portable statues of their gods, to visit the fanes of the devout Ethiopians. Upon this occasion, a solemn religious banquet was prepared, which lasted 12 days, and of which the priests of both nations were partakers. It was, we imagine, a kind of sacramental institution, by which both parties publicly avouched their agreement in the ceremonies of their religion respectively. These observations plainly show, that the most ancient Ethiopians were a people highly civilized; indeed so much, that the Egyptians were at one time contented to be their scholars. The tone of their language was certainly the same with that of the Chaldeans or Arabian Cushim, from whom they were descended. We know not whether there are any books in the ancient Ethiopic now extant; so that it is not easy to produce instances of its coincidence with the Chaldaic. Diogenes Laertius* informs us, that Thrasyllus, in his catalogue of the books composed by Democritus, mentions one, *περί των εν Μερὸν ἱερῶν γραμμάτων*, concerning the sacred letters in the island of Meroe (E); and another concerning the sacred letters in Babylon. Had these books survived the ravages of time, they would in this age of research and curiosity have determined not only the point under our consideration, but the affinity of sacred rites among the Chaldeans, Ethiopians, and Egyptians.

We have now shown that the Ethiopians were a colony of Cushites; that the Cushites were originally sovereigns of Shinar or Chaldea, and consequently spoke either Chaldaic or a dialect of that tongue;

Chaldean Language, &c. that their colonists must have used the same language; that the ancient Ethiopians were a people highly polished, and celebrated in the most early ages on account of their virtue and piety. It has likewise appeared, that the common letters of that people were the sacred characters of the Egyptians. These letters, we imagine, were the Cuphite; for which see the Sect. on the *Arabic*. When they were discarded, and the modern substituted in their room, cannot be determined; nor is it, we apprehend, a matter of much importance. We shall therefore drop that part of the subject, and refer our curious and inquisitive readers to the very learned Job Ludolf's (F) excellent grammar and Dictionary of the Abyssinian or Geez tongue, where they will find every thing worth knowing on that subject. We shall endeavour to gratify our readers with a very brief account of the modern Ethiopic or Abyssinian tongue; for which both they and we will be obliged to James Bruce, Esq; that learned, indefatigable, and adventurous traveller; who, by his observations on that country, which he made in person, often at the hazard of his life, has discovered, as it were, a new world both to Europe and Asia.

The most ancient language of Ethiopia, which we shall now call *Abyssinia* (its modern name), according to that gentleman, was the *Geez*, which was spoken by the ancient Cushite shepherds. This, we should think, approaches nearest to the old Chaldaic. Upon a revolution in that country, the court resided many years in the province of Amhara, where the people spoke a different language, or at least a very different dialect of the same language. During this interval, the *Geez*, or language of the shepherds, was dropt, and retained only in writing, and as a dead language: the sacred Scriptures being in that tongue only saved it from going into disuse. This tongue is exceedingly harsh and unharmonious. It is full of these two letters D and T, in which an accent is put that nearly resembles stammering. Considering the small extent of sea that divides this country from Arabia, we need not wonder that it has great affinity with the Arabic. It is not difficult to be acquired by those who understand any other of the oriental languages; and as the roots of many Hebrew words are only to be found here, it seems to be absolutely necessary to all those who wish to obtain a critical skill in that language.

66 The Ethiopic alphabet consists of 26 letters, each of which, by a *virgula* or point annexed, varies its sound in such a manner as that those 26 form as it were 62 distinct letters. At first they had but 25 of these original letters, the Latin P being wanting; so that they were obliged to substitute another letter in its place. *Paulus*, for example, they call *Taulus*, *Aulus*, or *Caulus*; *Petros*, they pronounced *Ketros*. At last they substituted T, and added this to the end of their alphabet; giving it the force of P, though it was really a repetition of a character rather than the invention of a new one. Besides these, there are 20 others of the nature of diphthongs; but some of them are

(E) Where the capital of Ethiopia was situated.

(F) A very learned German, who published a grammar and dictionary of the Geez in folio.

Chaldean
Language,
&c.

are probably not of the same antiquity with the letters of the alphabet, but have been invented in later times by the scribes for convenience.

The Amharic, during the long banishment of the royal family in Shoa, became the language of the court, and seven new characters were of necessity added to answer the pronunciation of this new language; but no book was ever yet written in any other language than *Geez*. There is an old law in the country, handed down by tradition, that whoever shall attempt to translate the Holy Scripture into Amharic or any other language, his throat shall be cut after the manner in which they kill sheep, his family sold to slavery, and their houses razed to the ground.

Before we leave this subject, we may observe, that all the ancients, both poets and historians, talk of a double race of Ethiopians; one in India, and another in Africa. What may have given rise to this opinion it is not easy to discover. Perhaps the swarthy complexion of both people may have led them to this sentiment. Eusebius indeed informs us*, that "a numerous colony of people emigrated from the banks of the Indus, and crossing the ocean, fixed their residence in the country now called Ethiopia." For our part, we are rather inclined to believe that the original Ethiopians transported themselves into India, and there perhaps co-operated with the Egyptians in digging the excavations and framing the statues, some of which are still to be seen in that country, and which we have mentioned in another Section. The Greeks called those people *Αἰθίοπες*, *Æthiopes* we believe, from their sun-burnt countenance; but indeed they were very little acquainted either with the country or its inhabitants.

The most ancient name of Egypt was *Mizraim*, of consequence the Arabians still call it *Mesri*. It was likewise distinguished by other names, such as *Oceana*, *Aeria*, &c. It appears from the sacred historian, that it was inhabited by the descendants of Mizraim the second son of Ham. Mizraim had several sons, who, according to the Scripture account, settled respectively in that country. If we trust to the sacred records, there will be little difficulty in ascertaining the language of the Mizraim. It will appear to be one of the sister dialects of the Hebrew, Phœnician, Arabic, Chaldaic, &c.; and this, to us, appears to be the fact. But the origin of that people, their language, religion, laws, and institutions, have been so warped and confounded, both by their own historians and those of other countries, that one is scarce able to determine what to believe or what to reject. Herodotus, Diodorus Siculus, Strabo, Ptolemy, and most other ancient geographers and historians, are universally agreed, that Egypt, at least that part of it called *Delta*, was overflowed by the sea, and consequently uninhabitable for many centuries after the dispersion of mankind. When we consider the low situation of the Delta, and the violent current of the tide from the coast of Phœnicia and Palestine towards that shore, we would be almost tempted to adopt this hypothesis; but the sa-

cred records avouch the contrary. According to them, we find Egypt a populous, rich, and flourishing kingdom, as early as the age of Abraham. Had the Lower Egypt been a pool of stagnating water at any time after the general deluge, we think it could not have been drained, cleared, cultivated, and stocked with inhabitants, so early as the days of Abraham.

Diodorus Siculus, however, is positive that the Egyptians were a colony of Ethiopians; and this he endeavours to prove by the similarity of features, customs, laws, religious ceremonies, &c. between the two nations. That there was a constant intercourse of good offices between these two branches of the Hamites, cannot be questioned; and that they nearly resembled each other in many respects, is too evident to admit of contradiction. The excavations, originally dug out of the solid rocks of porphyry and marble, in which the natives resided before the plains were drained, have been observed by a most judicious traveller (G) very few years ago. At the same time, the most accurate and judicious travellers (H) who have visited that region in modern times, are generally of opinion that the land has gained nothing on the sea since the period when Herodotus wrote his description of that country; from which circumstance we may be led to conclude, that the idea of the inundation of the Delta is not founded in fact.

But even admitting that the Egyptian Delta has acquired nothing from the sea since the age of Herodotus to the present, it certainly does not follow that the region in question was never overflowed by that element; since there are, in many parts of the globe, large tracts of land, certainly once covered with sea, which have continued to this day in the very same situation in which they were 2000 years ago. We leave the decision of this point to the judgment of our readers.

We have already hinted our opinion of the nature of the Egyptian language; but because Egypt is generally thought to have been the native land of hieroglyphics, and because many are of opinion that hieroglyphical characters were prior to alphabetical, we shall hazard a few conjectures with respect to that species of writing.

The end of speech, in general, is to enable men to communicate their thoughts and conceptions one to another when present; the use of writing is to perform the same office when people are at so great a distance that vocal sounds cannot mutually reach them. Hieroglyphics are said to have been invented to supply this defect. The most ancient languages were everywhere full of tropes and figures borrowed from sensible objects. As in that stage of society men have not learned to abstract and generalize, all their ideas are borrowed from such objects as most forcibly strike their senses. This circumstance would naturally suggest to savages the idea of conveying their sentiments to each other, when absent, by delineations of corporeal objects. Thus, if a savage asked a loan of his friend's

(G) See Mr Bruce's Travels, Vol. I.

(H) Mr Bruce, Dr Shaw, Bishop Pocock, Savary, Volney, &c.

* Chron.
p. 12.

67
Ancient
language
of Egypt a
sister dia-
lect of
Hebrew.

68
Egyptian
hierogly-
phics

Chaldean friend's horse, he might find means to have conveyed to him the figure of that animal; and so of others. Chaldean Language, &c. This was the very lowest species of ideal communication, and has been styled *picture-writing*.

Necessity would soon impel our savage correspondents to fabricate a method more extensively useful, which would likewise be suggested by the constant use of the metaphorical mode of speech. Some savage leader, more sagacious than the vulgar herd, would observe that certain sensible objects were fitted, according to the rules of analogy, to represent certain human passions, and even some abstract ideas; and this would be readily enough adopted by the herd as a new improvement. In this case a *horn* might be the emblem of *power*, a *sword* of *bravery*, a *lion* of *fury*, a *fox* of *cunning*, a *serpent* of *malice*, &c. By and by artificial signs might be contrived to express such ideas as could not readily be denoted by bodily objects. This might be called *symbolical writing*. Such was the foundation of the Chinese characters; and hence that prodigious number of letters of which the written language of that people is composed. Farther they could not proceed, notwithstanding their boasted inventive powers; and farther, we believe, no nation ever did proceed, who had once upon a time no other characters but hieroglyphical. The Mexicans had arrived at the very lowest stage of hieroglyphical writing, but had not taken one step towards alphabetical. The Hurons employ hieroglyphical symbols, but never entertained a single idea of alphabetical. Hieroglyphical characters are the images of objects conveyed to the mind by the organs of vision; alphabetic are arbitrary artificial marks of sound, accommodated by compact to convey to the mind the ideas of objects by the organs of hearing. In a word, we think that there is not the least analogy between these two species to conduct from the one to the other: we are therefore of opinion, that hieroglyphical characters were never the vulgar channels of ideal conveyance among civilized people.

69
Were never
in vulgar
use;

We know that in this point we differ from many learned, judicious, and ingenious writers; some of whom have taken much pains to investigate the intermediate stages through which the fabricators of characters must have passed in their progress from hieroglyphical to alphabetical writing. These writers have adopted a plan analogous to Bishop Wilkins's project of an artificial language. In this theory, we own, we are led to suspect that they supposed all mankind were once upon a time *savages*, and were left to hammer out words, as well as characters, by necessity, ingenuity, experience, practice, &c. For our part, we have endeavoured to prove, in our section on the Hebrew language, that alphabetical writing was an antediluvian invention; and we now lay it down as our opinion, that among all those nations which settled near the centre of civilization, hieroglyphics were, comparatively, a modern fabrication.

The Orientals are, at this day, extravagantly devoted to allegory and fiction. Plain unadorned truth with them has no charms. Hence that extravagant medley of fables and romance with which all antiquity is replete, and by which all ancient history is disguised and corrupted. Every doctrine of religion, every precept of morality, was tendered to mankind in parables

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and proverbs. Hence, says the Scripture, to understand a proverb, the words of the wise, and their dark sayings. The eastern sages involved their maxims in this enigmatical dress for several reasons: to fix the attention of their disciples; to assist their memory; to gratify their allegorical taste; to sharpen their wit and exercise their judgment; and sometimes perhaps to display their own acuteness, ingenuity, and invention.

It was among the ancients an universal opinion, that the most sacred arcana of religion, morality, and the sublime sciences, were not to be communicated to the uninitiated rabble. For this reason every thing sacred was involved in allegorical darkness.

Here, then, we ought to look for the origin of hieroglyphical or picture-writing among the civilized nations of the east. They did not employ that species of writing because they were ignorant of alphabetical characters, but because they thought fit to conceal the most important heads of their doctrines under hieroglyphical figures. The Egyptian priests were most celebrated for their skill in devising those emblematical representations; but other nations likewise employed them. We learn from the fragments of Berossus the Chaldean historian, preserved by Syncellus and Alexander Polyhistor, that the walls of the temple of Belus at Babylon were covered all over with those emblematical paintings. These characters were called *ἱεροί*, because they were chiefly employed to represent sacred objects; and *χρυσαῖα*, because they were originally carved or engraved. Their name points to their original use. Instead of pursuing these observations, which the nature of our design will not permit, we must refer our readers to Herodotus, l. ii. Diodorus Sic. l. i. Strabo, l. xvii. Plut. Isis and Osiris; and among the Christian fathers, to Clem. Alex. Euseb. Præp. Evang.; but chiefly to Horapollon's Hieroglyphica.

Chaldean
Language,
&c.

70
But em-
ployed to
conceal
sacred doc-
trines from
the unini-
tiated;

From this deduction we would conclude, that this species of writing was an adventitious mode in Egypt, peculiar to the priests, and employed chiefly to exhibit things sacred; and that among all civilized people it did not supersede the use of alphabetical characters, nor did the use of the latter originate from the former. When alphabetical letters were invented, if indeed they were a human invention, they were antecedent to the other in use and extent. The Egyptian priests alone knew the true import of those sacred symbols; and communicated that knowledge first to their own children from generation to generation, then to the initiated, and last of all to the grandees of the nation, all of whom were indeed initiated. The hieroglyphics of Egypt were not then the symbols of any sacred occult language; but signs invented by the priests and prophets or wise men, in order to represent their deities, the attributes and perfections of their deities, and the mysterious arcana of their religion, and many other circumstances relating to objects of importance, which were deemed either too sacred or too important to be imparted to the vulgar.

71
And poste-
rior in
time to
alphabetical
characters.

The Egyptians ascribed the invention of letters to a person whom they called *Thoth**, *Theuth*, or * *Euseb. Thyoth*; the Greeks *Ἡρμης*; and the Romans *Mercurius*. Plato† calls him a god, or a godlike man; † *Phædrus. Diodorus* ‡ makes him privy counsellor to Osiris; San- ‡ *Lib. i. choniathon*

Chaldean Pelasgi. The conclusion, therefore, is, that the vulgar Egyptian letters were the same with the Phœnician. Language, &c.

Chaldean Language, &c.

We are abundantly sensible that there are found upon Egyptian monuments characters altogether different from those we have been describing. At what time, by what people, and to what language, these letters belonged, we will not pretend to determine. The Ethiopians, the Chaldeans, the Persians, the Greeks, the Romans, the Saracens, have, at different times, been sovereigns of that unhappy country. Perhaps other nations, whose memory is now buried in oblivion, may have erected monuments, and covered them with inscriptions composed of words taken from different languages, perhaps, upon some occasions, whimsically devised, with a view to perplex the curious antiquaries of future ages. Some of these are composed of hieroglyphics intermingled with alphabetical characters, artificially deranged, in order to render them unintelligible. These we do not pretend to develope; because the most inquisitive and sagacious antiquaries are not yet agreed as to their purport and signification.

76
Egyptian names of Hebrew original,

We shall now go on to show, that most part of the names of persons and places, &c. which have been conveyed down to us, may, in general, be reduced to a Hebrew, Phœnician, Syrian, or Chaldean original. As the first of these languages is most generally known, we shall employ it as our arch-type or standard, beginning with those terms which occur in Scripture.

The word *Pharaoh*, the title of the *melech* or king of Egypt, is, we think, compounded of two terms, which plainly discover a Hebrew original. According to an oriental tradition, the first who assumed this title was the sovereign of the *royal shepherds*; a race of people from Arabia and Phœnicia. They conquered Egypt at an early period, and kept possession of it for several centuries. They gloried in the title *βασιλῆς*, or *βασιλεῖς*, which, according to Josephus *con. Apion*, signifies "royal shepherds." The word *Pharaoh* seems to be compounded of *Phar*, "a bullock," and *Rachab* "to feed;" hence *Pharachab*, as we think it ought to be written. The name given to Joseph is evidently of kin with the Hebrew; for *zaphnath* differs very little from the Hebrew verb *tzaphan*, which signifies "to hide, to keep secret;" *Paneah* or *Phaneah*, signifies much the same with the Hebrew *Phanab*, *aspexit*: so that the name actually intimates one who sees hidden things; which was certainly the very idea the prince intended to convey by giving him that name.

Potiphar, or *Potipherah*, the name of Joseph's father-in-law, has likewise a dialectical affinity with the Hebrew idiom. In that language *Patab* signifies "to open, to explain," which was one part of the sacerdotal office; and *Phar* imports "a bullock." *Potiphar* was then priest of the bullock, that is, the ox, *apis*, sacred to the sun (1). This person was priest or prince of On, which, according to Cyrillus on Hosea, was an Egyptian name of that luminary. The He-

brew word *hon* or *chon* signifies "power, wealth, sufficiency;" a very proper epithet for the sun, who was thought to bestow those blessings. The name of Joseph's wife was *Asenath* or *Afnath*, compounded of *Ishab* "a woman," and *Naith* or *Neit*, an Egyptian name of "Minerva, a votary of Minerva."

Almost all the names of cities belonging to Egypt which are mentioned in Scripture are evidently Hebrew. To be satisfied as to this position, our curious readers may consult Jamieson's *Spicilegia*, an excellent book very little known. The names of most of the Egyptian deities are significant in the Hebrew tongue; and in that dialect the names appear to have been imposed with great judgment and propriety, plainly indicating some office assigned them, or pointing to some peculiar attribute. We shall produce a few instances.

77
And significant in that language.

Osiris was the great divinity of Egypt; he was certainly the sun. The Egyptians gave their deities a variety of names in allusion to their various offices and attributes. Jablonski has in a manner wearied himself with tracing the signification of this name. In Hebrew we have *Ofbir* "to grow rich, to be enriched." The sun may be called the great enricher of nature, and therefore might properly be called by a name alluding to that quality. *Isis* was both the moon and the earth. *Ishab* is the Hebrew word for *woman*, and Horapollon assigns this very derivation. *Anubis* was one of the names of Mercury among the Egyptians: He was always figured with the head of a dog. He accompanied *Isis* in her peregrinations in quest of *Osiris*, and frightened away the wild beasts from attacking the princess. In Hebrew, *Nubab* signifies "to bark." Here the analogy, we think, is evident. Many Egyptian names begin with *Can*, such as *Canobus*, *Canopus*, &c. The Hebrew word *Caben* or *Cohen*, Syr. *Con* or *Chon*, intimates both a prince and a priest. *Ob* or *Aub*, in Hebrew, imports "a bottle, a flaggon," any thing round and prominent like the human belly. In the language of Egypt it was often applied to the sun, in allusion to his rotundity. In the temple of *Jupiter Ammon* or *Amon*, in the desert of Lybia, there was a statue of the god representing the navel of the human body, which was probably framed in allusion to this fancy. Hence the Pythoness, or people who, according to the Scripture, had familiar spirits, were said to prophecy by the inspiration of *Ob*, as the Delphic priestess did by that of *Apollo*. Again, many Egyptian names end with *siris*, as *Calasiris*, *Termosiris*. This termination is no doubt a cognate of the Hebrew and Chaldean *sar* or *zar*, signifying "a prince, or grandee, &c." The river Nile in the Ethiopic dialect is called *Siris*; that is, we believe, the king of rivers. The same flood seems to derive the name by which it is generally known, from the Hebrew *nebel*, "a valley, or torrent running down a valley." The same river was often called *Oceanus*, a word composed of *og*, or *oc*, or *och*, which signifies "a king, a leader," and the Hebrew *oin* "a fountain;" so that the word imports the king of fountains. The Hebrews always denominated the land of Egypt the

3 T 2

(1) The Septuagint (Gen. xli. v. 45 and 50.) translate On by *Ἡλιόπολις*.

76
Persian
Language.

the land of Mizraim; the Egyptians themselves, in later times, seem to have called it *Αἴγυπτος* *Ægyptus*, "Egypt," which some think is compounded of *Ai*, Hebrew, "an island, a country, a province," and *Copt* or *Cupt*, "a famous city in that country."

From this specimen, we hope it will appear that the Egyptian language in the more early ages was one of those dialects into which that of the descendants of the postdiluvian patriarchs was divided, and perhaps subdivided, a few centuries after the deluge. Among all those, we believe, such an affinity will be found, as plainly demonstrates that they originally sprang from one common stock. Here we might easily follow the Egyptian language into Greece; and there we are persuaded we might trace a vast number of Egyptian terms into that tongue, which, however, the nature of this inquiry will not permit. If our learned readers should incline to know more of the affinity of the Egyptian tongue with the others so often mentioned, they may consult Bochart's *Chanaan*, Walton's *Proleg.* Gebelin's *Monde Prim.* Jamelson's *Spicilegia*, &c.

SECT. IV. Of the Persian Language.

THE Persian language is divided into the ancient and modern; the former of which is at this day very imperfectly known, the latter is at present one of the most expressive, and at the same time one of the most highly polished, in the world. We shall, in treating of this language, in compliance with the plan we have all along followed, begin with the ancient.

78
At the
birth of
Moham-
med two
languages
prevalent
in Persia,

When Mohammed was born, and ANU'SH'IRAVAN, whom he calls the *just king*, sat on the throne of Persia, two languages were generally prevalent in that empire (κ). The one was called *Deri*, and was the dialect of the court, being only a refined and elegant branch of the *Parfi*, so called from the province of which *Sbiraz* is now the capital; and that of the learned, in which most books were composed, and which had the name of *Pahlavi*, either from the heroes who spake it in former times, or from *pablu*, a tract of land which included some considerable cities of *Iran*: The ruder dialects of both were spoken by the rustics of several provinces; and many of these distinct idioms were vernacular, as happens in every kingdom of considerable extent. Besides the *Parfi* and *Pahlavi*, a very ancient and abstruse tongue was known to the priests and philosophers, called the language of the *zend*, because a book on religious and moral duties which they held sacred, and which bore that name, had been written in it; while the *Pazend* or comment on that work was composed in *Pahlavi*, as a more popular dialect. The letters of this book were called *zend*, and the language *avesta*.

79
And a
more an-
cient lan-
guage than
either
known only
to the
priests.

The *Zend* and the old *Pahlavi* are now almost extinct in *Iran*, and very few even of the *Guebres* can read it; while the *Parfi* remaining almost pure in *Shab-nameh*, has, by the intermixture of Arabic words, and many imperceptible changes, now become a new language exquisitely polished by a series of fine writers

both in prose and verse, analogous to the different idioms gradually formed in Europe after the subversion of the Roman empire.

80
Persian
Language.

The very learned and laborious Sir William Jones is confident that the *Parfi* abounds with words from the *Shanscrit*, with no other change than such as may be observed in the numerous dialects of India; that very many Persian imperatives are the roots of *Shanscrit* verbs; and that even the moods and tenses of the Persian verb substantive, which is the model of all the rest, are deducible from the *Shanscrit* by an easy and clear analogy. From this he infers that the *Parfi*, like the various idiom dialects, is derived from the language of the *Bramins*. This conclusion, we imagine, is not altogether just, since by the same train of reasoning we may infer that the *Shanscrit* is derived from the *Parfi*.

The same learned gentleman adds, that the multitude of compounds in the Persian language proves that it is not of Arabic but Indian original. This is undoubtedly true; but though the *Parfi* is not of Arabic original, it does not necessarily follow that it is of *Shanscrit*. We might with the same propriety, and with an equal show of reason, conclude, that the Greek language is descended of the *Shanscrit*, because it too abounds with compounds. We may then rest assured, that neither the one nor the other argument adduced by the ingenious president proves that the *Parfi* tongue is a descendant of the *Shanscrit*.

The gentleman so often mentioned, assures us, that the *Zend* bears a strong resemblance to the *Shanscrit*; which, however, it might do without being actually derived from it, since we believe every oriental scholar will find that all the languages from the Mediterranean to the utmost coast of Hindostan exhibit very strong signatures of a common original. The *Parfi*, however, not being the original dialect of *Iran* or *Persia*, we shall pursue it no farther at present, but return to give some account of the *Pahlavi*, which was probably the primitive language of the country. We have observed above, that the *Pazend* or comment on the *Zend* was composed in the *Pahlavi* for the use of the vulgar. This, according to Sir William, was a dialect of the *Chaldaic*; and of this assertion he exhibits the following proof.

81
The Pahlavi.

By the nature of the Chaldean tongue, most words ended in the first long vowel, like *shemaiá* "heaven;" and that very word, unaltered in a single letter, we find in the *Pazend*, together with *lailiá* "night," *meyá* "water," *nirá* "fire," *matrá* "rain," and a multitude of others, all Arabic or Hebrew, with a Chaldean termination; so *zamár*, by a beautiful metaphor from *pruning trees*, means in Hebrew to *compose verses*, and thence, by an easy transition, to *sing* them; now in *Pahlavi* we see the verb *zamarúniten* "to sing," with its forms *zamaraunemi* "I sing," and *zamazunid* "he sang;" the verbal terminations of the Persian being added to the Chaldaic root. All these words are integral parts of the language; not adventitious like the Arabic nouns and verbals engrafted on modern Persian.

From

(κ) The moderns call the empire of Persia *Iran*; a name unknown to the ancients.

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Persian
Language

Persian
Language.

From this reasoning it plainly appears, 1st, that Pahlavi was the ancient language of Persia; and, 2d, that the ancient Persian was a cognate dialect of the Chaldean, Hebrew, Arabic, Phœnician, &c. M. Anquetil has annexed to his translation of the *Zendavesta* two vocabularies in Zend and Pahlavi, which he found in an approved collection of *Rawayat* or *Traditional Pieces* in modern Persian. His vocabulary of the Pahlavi strongly confirms this opinion concerning the Chaldaic origin of that language. But with respect to the Zend, it abounded with vast numbers of pure Shanscrit words, to such a degree, that six or seven words in ten belonged to that language.

83
Derived
from Chal-
daic and
Shanscrit,
&c.

From this deduction it would appear, that the oldest languages of Persia were Chaldaic and Shanscrit: and that when they had ceased to be vernacular, the Pahlavi and Zend were deduced from them respectively, and the Parsi either from the Zend, or immediately from the dialect of the Brahmans: but all had perhaps a mixture of Tartarian; for the best lexicographers assert, that numberless words in ancient Persian are taken from the Cimmerians. With respect to the last of these, we cannot help being of opinion, that colonies of people from the neighbourhood of Persia did transport themselves into Crim Tartary, and perhaps into Europe. These colonists brought along with them those vocables which still occur in their dialect. Emigrants from those quarters must have found their way into Scandinavia, since numberless Persian words are still current in those regions. Perhaps Odin and his followers emigrated from the neighbourhood of Media and Persia, and brought with them the dialect of the nations from whose country they had taken their departure.

83
The Zend
from the
same
source.

With respect to the Zend, it might well be a dialect of the Shanscrit, and was probably a sacred language; and if so, concealed from the vulgar, and reserved for the offices of religion. If Zoroastres, or Zaratusht as the orientals call him, travelled into Egypt, and was initiated in the mysteries of the Egyptian religion, as some pretend he was, he might be instructed in the sacred dialect of that people by the priests under whom he studied. When that philosopher returned into Persia, and became the apostle of a new religion, he might compose the volume of his laws and religious institutions in the sacred language of his Egyptian tutors. This language then became that of the Magi, who concealed it carefully from the knowledge of the uninitiated, as the priests did in Egypt and the Brahmans in Hindostan.

In our Section on the *Shanscrit* language, we shall give a detail of a number of particulars, which to us seem to furnish a presumption that the language in question was imported from Egypt into Hindostan. We confess there are not sufficient data to improve these presumptions into absolute certainty; but we hope the time is at hand when the worthy members of the Asiatic Society will discover abundant materials to ascertain the truth of this position. We are the rather inclined to adopt this hypothesis, when we consider the character of Zoroastres in connection with that of the Egyptian Cohens and of the Indian Brahmans.

If this opinion should one day appear to be well-founded, we believe the coincidence between the lan-

guage of the Zend and the Shanscrit will be easily accounted for, without making the Hindoos masters of Iran or Persia, and then driving them back to the shores of the Ganges. That the nations of Turan or Scythia did actually over-run that country, and make themselves masters of a considerable part of it at different times, is vouched by the records and traditions of the Persians themselves. Upon those occasions a number of Tartarian words might be introduced into the country, and acquire a currency among the inhabitants. As the annals of ancient Persia have been long since destroyed and consigned to eternal oblivion, it is impossible to ascertain either the extent or duration of these irruptions. Indeed the nature of our design does not call for that investigation.

In order to corroborate the cognation between the Chaldean and Pahlavi languages, we shall subjoin a few arguments derived from the Mosaic history, and the other writings of the Old Testament. These we believe will be admitted as irrefragable proofs of the position above advanced by such as admit the authenticity of those records.

84
Proofs
from
Scripture of
the origin
of the Pahlavi.

Elam is always allowed to have been the progenitor of the Persians. This patriarch was the eldest son of Shem the son of Noah; and according to the Mosaic account, his posterity settled in the neighbourhood of the descendants of Ashur, Arphaxad, Lud, and Aram, the other sons of Shem. The country where they settled was denominated *Elymais** as late as the beginning of the Christian era. This name was retained till the Saracens conquered and took possession of that country. If this was the case, as it certainly was, the Elamites or Persians spoke a dialect of the primary language, which, in the first Section, we have proved to have been the Hebrew.

* Strabo, lib. 11.

When the four eastern monarchs invaded the five cities of the plain in Canaan †, Chedorlaomer king of Elam was at the head of the confederacy. Amraphel king of Shinar, that is Babylon or Chaldea, was one of the allies; Arioch king of Elasar was another; and Tidal, king of some scattered nations in the same neighbourhood, was the fourth. That Chedorlaomer was principal in this expedition, is obvious from the historian's detail of the second, where that prince is placed first, and the rest are named *the kings that were with him*. This passage likewise demonstrates, that Elam, Shinar, and Elazar, lay contiguous, and were engaged in the same cause. Wherever the country in question is mentioned in Scripture prior to the era of Daniel and Ezra, it is always under the name of *Elam*. To go about to prove this would be superfluous.

† Gen. chap. xiv.

According to Xenophon ‡, the Persians knew nothing of horsemanship before the age of Cyrus: but that historian informs us, that after that monarch had introduced the practice of fighting on horseback, they became so fond of it, that no man of rank would deign to fight on foot. Here it ought to be considered, that the historian above mentioned was now writing a moral, military, and political romance; and therefore introduces this anecdote, in order to exalt the character of his hero: so that we are not to suppose that the people under consideration were unacquainted with the art of horsemanship till that period.

‡ Cyclop. lib. 1.

The very name *Phars* or *Pharas* is certainly of He-

brew.

Perſian
Language

Lib. 9.
cap. 85.

brew origin, and alludes to the ſkill that people profeſſed in horſemanſhip. The original ſeems to be *Pharſah*, *ungula* "a hoof;" and in the Arabic *Pharas* intimates a *horſe*, and *Pharis* a *horſeman*. Conſequently the people were denominated *Parſai*, and the country *Pars*, becauſe they were trained from their infancy to ride the *great horſe*, which indeed they deemed their greateſt honour. This name was perhaps firſt impoſed upon them by the neighbouring nations, and in proceſs of time became their gentile appellation. *Mithras* is generally known to have been the chief divinity of the Perſians; a name which is plainly derived from *Mithra* "great." We find in Strabo the Perſian god *Amanus*, which is plainly a cognate of *Hamah* the "ſun or fire." Hence we believe comes *Hamarim*, the "hearths or chapels" where the fire ſacred to the ſun was kept burning; which, we believe, the Greeks called *ἱερὰ* or "fire-temples." Herodotus* mentions a cuſtom among the Perſians, according to which, when they came to engage an enemy, they caſt a rope with a kind of gin at the end of it on their enemy, and by thoſe means endeavoured to entangle and draw him into their power. The people of Perſia who employed this net or gin were called *Sagartes*, from *ſarags*, *ſbarag*, or *ſerig*, a word which in Hebrew, Arabic, and Chaldaic, ſignifies to "hamper or entangle:" hence perhaps the Greek word *σάγαν*, a "basket or net." *Sar* or *zar* in Hebrew, Phœnician, Syriac, &c. ſignifies "a lord, a prince;" and hence we have the initial ſyllable of the far-famed *zar-tuſht*, *Zoroaſtres*. In a word, moſt of the Perſian names that occur in the Grecian hiſtories, notwithſtanding the ſcandalous manner in which they have been diſguiſed and metamorphoſed by the Greeks, may ſtill with a little ſkill and induſtry be traced back to a Hebrew, Chaldaic, Syriac, or Phœnician origin. In the books of Daniel, Ezra, Nehemiah, and Eſther, we find a number of Perſian names which are all of a Hebrew or Chaldaic complexion: to investigate theſe at much greater length would be foreign to the deſign of the preſent article. If our curious reader ſhould incline to be more fully ſatisfied as to this point, he may conſult Bochart's *Chanaan*, D'Herbelot's *Bib. Orient.* Walton's *Proleg.* &c.

It now appears, we hope, to the entire ſatisfaction of our readers, that the Pahlavi is a remnant of the old Perſian, and that the latter is a cognate branch of the Hebrew, Chaldaic, Syriac, &c. We have likewiſe adduced ſome presumptive proofs that the Zend was copied from the ſacred language of the Egyptians: we ſhall now endeavour to explain by what changes and revolutions the language firſt mentioned arrived at its preſent ſummit of beauty and perfection.

85
Progreſs of
the Perſian
Language.

We have obſerved above, that the Scythians, whom the old Perſians called *Saxai* *Saca*, and whom the modern call *Turan*, often invaded and over-ran Perſia at a very early period. The conſequence was, an inſuſion of Scythian or Tartarian terms, with which that language was early impregnated. This in all probability occaſioned the firſt deviation from the original ſtandard. The conqueſts of Alexander, and the dominion of his ſucceſſors, muſt, one would imagine, introduce an inundation of Greek words. That event, however, ſeems to have affected the language in no

conſiderable degree, at leaſt very few Grecian terms occur in the modern Perſian.

Perſian
Language

The empire of the *Arſacide* or Parthians, we apprehend, produced a very important alteration upon the ancient Perſian. They were a demi-Scythian tribe; and as they conquered the Perſians retained the dominion of thoſe parts for ſeveral centuries, and actually incorporated with the natives, their language muſt neceſſarily have given a deep tincture to the original dialect of the Perſians. Sir William Jones has obſerved, that the letters of the inſcriptions at *Iſtakhr* or Perſepolis bear ſome reſemblance to the old Runic letters of the Scandinavians. Thoſe inſcriptions we take to have been Parthian; and we hope, as the Parthians were a Tartarian clan, this conjecture may be admitted till another more plausible is diſcovered. The Perſians, it is true, did once more recover the empire; and under them began the reign of the Deri and Parſi tongues: the former conſiſting of the old Perſian and Parthian highly poliſhed; the latter of the ſame languages in their uncultivated vernacular dreſs. In this ſituation the Perſian language remained till the invaſion of the Saracens in 636; when theſe barbarians over-ran and ſettled in that fine country; demolished every monument of antiquity, records, temples, palaces; every remain of ancient ſuperſtition; maſſacred or expelled the miniſters of the Magian idolatry; and introduced a language, though not entirely new, yet widely differing from the old exemplar.

But before we proceed to give ſome brief account of the modern Perſian, we muſt take the liberty to hazard one conjecture, which perhaps our adepts in modern Perſian may not find themſelves diſpoſed to admit. In modern Perſian we find the ancient Perſian names wonderfully diſtorted and deflected from that form under which they appear in the Scripture, in Cteſias, Megaltheſes, and the other Greek authors. From this it has been inferred, that not only the Greeks, but even the ſacred hiſtorians of the Jews, have changed and metamorphoſed them moſt unmercifully, in order to accommodate them to the ſtandard of their own language. As to the Greeks, we know it was their conſtant practice, but we cannot believe ſo much of the Hebrews. We make no doubt of their writing and pronouncing the names of the Perſian monarchs and governors of that nation nearly in the ſame manner with the native Perſians. It is manifeſt, beyond all poſſibility of contradiction, that they neither altered the Tyrian and Phœnician names of perſons and places when they had occaſion to mention them, nor thoſe of the Egyptians when they occurred in their writings. The Babylonian and Chaldaic names which are mentioned in the Old Teſtament vary nothing from the Chaldean original. No reaſon can be aſſigned why they ſhould have transformed the Perſian names more than the others. On the contrary, in Ezra, Nehemiah, and Eſther, we find the Perſian names faithfully preſerved throughout.

The fact, we imagine, is this: Our modern admirers of the Perſic have borrowed their names of the ancient kings and heroes of that country from romances and fabulous legends of more modern date and compoſition. The archives of Perſia were deſtroyed by the Saracens: nothing of importance was written in that country till two centuries after the era of Mohammed. What ſucceeded was all fiction and romance.

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Nothing
now exiſt-
ing in Per-
ſic, except
the Zend,
older than
the Saracen
conqueſt.

Perfian
Language.

The authors of those entertaining compositions either forged names of heroes to answer their purpose, or laid hold on such as were celebrated in the ballads of their country, or preserved by vulgar tradition. The names were no doubt very different from those of the ancient kings and heroes of Persia; and probably many of them had undergone considerable changes during the continuance of the Parthian empire. Upon this foundation has the learned Mr Richardson erected a very irregular fabric, new, and, to use his own expression, we think built upon *pillars of ice*. He has taken much pains to invalidate the credit of the Grecian histories of the Persian empire, by drawing up in battle array against their records legions of romantic writers, who were not born till near a thousand years after the events had taken place; and to complete the probability, who lived 200 years after all the chronicles of the Medes and Persians had been finally destroyed by the fury of the Saracens.

After the decisive victory obtained over the Persians at Kadessa, their ancient government was overturned, their religion proscribed, their laws trampled under foot, and their civil transactions disturbed by the forcible introduction of the lunar for the solar kalendar; while, at the same time, their language became almost overwhelmed by an inundation of Arabic words; which from that period, religion, authority, and fashion, incorporated with their idiom.

From the seventh till the tenth century the Persian tongue, now impregnated with Arabic words, appears to have laboured under much discouragement and neglect. Bagdad, built by Almanzor, became soon after the year 762 the chief residence of the khalifs, and the general resort of the learned and the ambitious from every quarter of the empire. At length the accession of the Buyah princes to the Persian throne marked in the tenth century the great epoch of the revival of Persian learning. About the year 977 the throne of Persia was filled by the great Azaduddawla; who first assumed the title of *Sultan*, afterwards generally adopted by eastern princes. He was born in Isfahan, and had a strong attachment to his native kingdom. His court, whether at Bagdad or in the capital of Persia, was the standard of taste and the favourite residence of genius. The native dialect of the prince was particularly distinguished, and became soon the general language of composition in almost every branch of polite learning. From the end of the tenth till the fifteenth century may be considered as the most flourishing period of Persian literature. The epic poet Firdausi, in his romantic history of the Persian kings and heroes, displays an imagination and smoothness of numbers hardly inferior to Homer. The whole fanciful range of Persian enchantment he has interwoven in his poems, which abound with the noblest efforts of genius. This bard has stamped a dignity on the monsters and fictions of the east, equal to that which the prince of epic poetry has given to the mythology of ancient Greece. His language may at the same time be considered as the most refined dialect of the ancient Persian, the Arabic being introduced with a very sparing hand: whilst Sadi, Jami, Hafez, and other succeeding writers, in prose as well as verse, have blended in their works the Arabic without reserve; gaining perhaps in the nervous luxuriance of the one language

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The most
flourishing
period of
Persian li-
terature.

what may seem to have been lost in the softer delicacy of the other. Hence Ebn Fekreddin Anju, in the preface to the dictionary called *Farhang Jebanguiri*, says, that the Deri and the Arabic idioms were the languages of heaven; God communicating to the angels his milder mandates in the delicate accents of the first, whilst his stern commands were delivered in the rapid accents of the last.

For near 300 years the literary fire of the Persians seems indeed to have been almost extinguished; since, during that time, hardly any thing of that people which deserves attention has appeared in Europe: enough, however, has already been produced, to inspire us with a very high opinion of the genius of the east. In taste, the orientals are undoubtedly inferior to the best writers of modern Europe; but in invention and sublimity, they are excelled, perhaps equalled, by none. The Persians affect a rhetorical luxuriance, which to a European wears the air of unnecessary redundancy. If to these leading distinctions we add a peculiar tone of imagery, of metaphor, of allusion, derived from the difference of government, of manners, of temperament, and of such natural objects as characterise Asia from Europe; we shall see, at one view, the great points of variation between the writers of the east and west. Amongst the oriental historians, philosophers, rhetoricians, and poets, many will be found who would do honour to any age or people; whilst their romances, their tales, and their fables, stand upon a ground which Europeans have not yet found powers to reach. We might here quote the Arabian Nights Entertainments, Persian Tales, Pilpay's Fables, &c.

We shall now annex a few strictures on the genius of that noble language; though it is our opinion that the province of the philologist is to investigate the origin, progress, and final improvement of a language, without descending to its grammatical minutiae or peculiar idiomatic distinctions. We have already observed, that the tongue under consideration is partly Arabic and partly Persian, though the latter generally has the ascendant. The former is nervous, impetuous, and masculine; the latter is flowing, soft, and luxuriant. Wherever the Arabic letters do not readily incorporate with the Persian, they are either changed into others or thrown away. Their letters are the Arabic with little variation; these being found more commodious and expeditious than the old letters of the Deri and Parfi. Their alphabet consists of 32 letters, which, like the Arabic, are read from right to left; their form and order will be learned from any grammar of that language. The letters are divided into vowels and consonants as usual. The Arabic characters, like those of the Europeans, are written in a variety of different hands; but the Persians write their poetical works in the *Talik*, which answers to the most elegant of our Italic hands.

There is a great resemblance between the Persian and English languages in the facility and simplicity of their form and construction: the former, as well as the latter, has no difference of terminations to mark the gender either in substantives or adjectives; all inanimate things are neuter; and animals of different sexes have either different names, or are distinguished by the words *ner* male, and *made* female. Sometimes indeed

Perfian
Language.

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The genius
of the mo-
dern Persic.

89

Resem-
blance be-
ween Per-
sian and
English.

Persian
Language.

deed a word is made feminine, after the manner of the Arabians, by having *u* added to it.

The Persian substantives have but one variation of case, which is formed by adding a syllable to the nominative in both numbers; and answers often to the dative, but generally to the accusative, case in other languages. The other cases are expressed for the most part by particles placed before the nominative. The Persians have two numbers, singular and plural; the latter is formed by adding a syllable to the former.

The Persian adjectives admit of no variation but in the degrees of comparison. The comparative is formed by adding *ter*, and the superlative by adding *terin* to the positive.

The Persians have active and neuter verbs like other nations; but many of their verbs have both an active and neuter sense, which can be determined only by the construction. Those verbs have properly but one conjugation, and but three changes of tense: the imperative, the aorist, and the preterite; all the other tenses being formed by the help of particles or of auxiliary verbs. The passive voice is formed by adding the tenses of the substantive verb to the participle of the active.

In the ancient language of Persia there were very few or no irregularities; the imperative, which is often irregular in the modern Persian, was anciently formed from the infinitive, by rejecting the termination *eden*: for originally all infinitives ended in *den*, till the Arabs introduced their harsh consonants before that syllable, which obliged the Persians, who always affected a sweetness of pronunciation, to change the old termination of some verbs into *ten*, and by degrees the original infinitive grew quite obsolete: yet they still retain the ancient imperative, and the aorists which are formed from it. This little irregularity is the only anomalous part of the Persian language; which nevertheless far surpasses in simplicity all other languages ancient or modern.

With respect to the more minute and intricate parts of this language, as well as its derivations, compositions, constructions, &c. we must remit our readers to Mininski's *Institutiones Linguae Turcicae cum rudimentis parallelis linguarum Arab. et Pers.* Sir William Jones's Persian Grammar; Mr Richardson's Arabian and Persian Dictionary; D. Herbelot's *Bibl. Orient.* Dr Hyde *de Relig. vet. Pers.* &c. Our readers, who would penetrate into the innermost recesses of the Persian history, colonies, antiquities, connections, dialects, may consult the last mentioned author, especially chap. xxxv. *De Persia et Persarum nominibus, et de moderna atque veteri lingua Persica, ejusque dialectis.* In the preceding inquiry we have followed other authors, whose accounts appeared to us more natural, and much less embarrassing.

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Utility of
the Ara-
bian and
Persian lan-
guages.

To conclude this section, which might easily have been extended into a large volume, we shall only take the liberty to put our readers in mind of the vast utility of the Arabian and Persian languages. Numberless events are preserved in the writings of the orientals which were never heard of in Europe, and must have for ever lain concealed from the knowledge of its inhabitants, had not these two tongues been studied and understood by the natives of this quarter of the globe. Many of those events have been transmit-

ted to posterity in poems and legendary tales like the Runic fragments of the north, the romances of Spain, or the Heroic ballads of our own country. Such materials as these, we imagine, may have suggested to Firdausi, the celebrated heroic poet of Persia, many of the adventures of his *Shahnamé*; which, like Homer when stripped of the machinery of supernatural beings, is supposed to contain much true history, and a most undoubted picture of the superstition and manners of the times. The knowledge of these two languages has laid open to Europe all the treasures of oriental learning, and has enriched the minds of Britons with Indian science as much as the produce of these regions has increased their wealth and enervated their constitution.

Persian
Language.

Before we conclude this section, we shall subjoin a few strictures on the nature of Persian poetry, in order to render our inquiry the more complete. The modern Persians borrowed their poetical measures from the Arabs: they are exceedingly various and complicated; they consist of 19 different kinds; but the most common of them are the *Iambic* or *Trochaic* measure, and a metre that chiefly consists of those compounded feet which the ancients called *Enjambes*, which are composed of iambic and spondees alternately. In lyric poetry their verses generally consist of 12 or 16 syllables: they sometimes, but seldom, consist of 14. Some of their lyric verses contain 13 syllables: but the most common Persian verse is made up of 11; and in this measure are written all their great poems, whether upon heroic or moral subjects, as the works of Firdausi and Jami, the *Bostan* of Sadi, and the *Mesnavi* of Gelaeddin. This sort of verse answers to our common heroic rhyme, which was brought to so high a degree of perfection by Pope. The study of the Persian poetry is so much the more necessary, as there are few books or even letters written in that language, which are not interspersed with fragments of poetry. As to their prosody, nothing can be more easy and simple. When the student can read prose easily, he will with a little attention read poetry with equal facility.

SECT V. *Shanscrit and Bengalese Languages.*

THE Shanscrit, though one of the most ancient languages in the world, was little known even in Asia till about the middle of the present century. Since that period, by the indefatigable industry of the very learned and ingenious Sir William Jones and the other worthy members of that society of which he has the honour to be president, that noble and ancient language has at length been brought to light; and from it vast treasures of oriental knowledge will be communicated both to Europe and Asia; knowledge which, without the exertions of that happy establishment, must have lain concealed from the researches of mankind to the end of the world. In this section we propose to give to our readers such an account of that language as the limits of the present article, and the helps we have been able to procure, shall permit.

The Shanscrit language has for many centuries lain concealed in the hands of the bramins of Hindostan. It is by them deemed sacred, and is of consequence confined solely to the offices of religion. Its name imports

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The Shan-
scrit one
of the most
ancient
languages
in the
world.

Shanscrit
and Benga-
lese Lan-
guages.

Shanscrit
and Benga-
lese Lan-
guages.

93
Traces of
Shanscrit in
every dis-
trict of
Asia and
elsewhere.

imports the *perfect language*, or, according to the eastern style, the *language of perfection*; and we believe no language ever spoken by man is more justly intitled to that high epithet.

The grand source of Indian literature, and the parent of almost every dialect from the Persian gulph to the China seas, is the Shanscrit; a language of the most venerable and most remote antiquity, which, tho' at present shut up in the libraries of the bramins, and appropriated solely to the records of their religion, appears to have been current over most of the oriental world. Accordingly traces of its original extent may be discovered in almost every district of Asia. Those who are acquainted with that language have often found the similitude of Shanscrit words to those of Persian and Arabic, and even of Latin and Greek; and that not in technical and metaphorical terms, which refined arts and improved manners might have occasionally introduced, but in the main ground-work of language, in monosyllables, the names of numbers, and appellations of such things as would be first discriminated on the immediate dawn of civilization.

The ancient coins of many different and distant kingdoms of Asia are stamped with Shanscrit characters, and mostly contain allusions to the old Shanscrit mythology. Besides, in the names of persons and places, of titles and dignities, which are open to general notice, even to the farthest limits of Asia, may be found manifest traces of the Shanscrit. The scanty remains of Coptic antiquities afford little scope for comparison between that idiom and this primitive tongue; but there still exists sufficient ground to conjecture, that, at a very early period, a correspondence did subsist between these two nations. The Hindoos pretend, that the Egyptians frequented their country as disciples, not as instructors; that they came to seek that liberal education and those sciences in Hindostan, which none of their own countrymen had sufficient knowledge to impart. Perhaps we may examine the validity of this claim hereafter.

But though numberless changes and revolutions have from time to time convulsed Hindostan, that part of it which lies between the Indus and the Ganges still preserves that language whole and inviolate. Here they still offer a thousand books to the perusal of the curious; many of which have been religiously handed down from the earliest periods of human existence.

The fundamental part of the Shanscrit language is divided into three classes: *Dhaat*, or roots of verbs, which some call primitive elements; *Shabd*, or original nouns; and *Eva*, or particles. The latter are ever indeclinable, as in other languages; but the words comprehended in the two former classes must be prepared by certain additions and inflexions to fit them for a place in composition. And here it is that the art of the grammarian has found room to expand itself, and to employ all the powers of refinement. Not a syllable, not a letter, can be added or altered but by regimen; not the most trifling variation of the sense, in the minutest subdivision of declension or conjugation, can be effected without the application of several rules: all the different forms for every change of gender, number, case, person, tense, mood, or degree, are methodically arranged for the assistance of the me-

mory, according to an unerring scale. The number of the radical or elementary parts is about 700; and to these, as to the verbs of other languages, a very plentiful stock of verbal nouns owes its origin; but these are not thought to exceed those of the Greek either in quantity or variety.

To the triple source of words mentioned above, every term of truly Indian original may be traced by a laborious and critical analysis. All such terms as are thoroughly proved to bear no relation to any one of the Shanscrit roots, are considered as the production of some remote and foreign idiom, subsequently ingrafted upon the main stock; and it is conjectured, that a judicious investigation of this principle would throw a new light upon the first invention of many arts and sciences, and open a fresh mine of philological discoveries. We shall now proceed to give as exact an account of the constituent parts of this language as the nature of our design will permit.

The Shanscrit language is very copious and nervous. The first of these qualities arises in a great measure from the vast number of compound words with which it is almost overstocked. "The Shanscrit (says Sir William Jones), like the Greek, Persian, and German, delights in compounds; but to a much higher degree, and indeed to such excess, that I could produce words of more than 20 syllables; not formed ludicrously like that by which the buffoon in Aristophanes describes a feast, but with perfect seriousness, on the most solemn occasions, and in the most elegant works." But the style of its best authors is wonderfully concise. In the regularity of its etymology it far exceeds the Greek and Arabic; and, like them, has a prodigious number of derivatives from each primary root. The grammatical rules also are numerous and difficult, though there are not many anomalies. As one instance of the truth of this assertion, it may be observed, that there are seven declensions of nouns, all used in the singular, the dual, and the plural numbers, and all of them differently formed, according as they terminate with a consonant, with a long or a short vowel; and again, different also as they are of different genders: not a nominative case can be formed to any one of these nouns without the application of at least four rules, which vary likewise with each particular difference of the nouns, as above stated: add to this, that every word in the language may be used through all the seven declensions, which is a full proof of the difficulty of the idiom.

The Shanscrit grammars are called *Beeākērun*, of which there are many composed by different authors; some too abstruse even for the comprehension of most bramins, and others too prolix to be ever used but as references. One of the shortest, named the *Sārāfootee*, contains between two and three hundred pages, and was compiled by Anōbhōtēē Seroopēnām Achārige, with a conciseness that can scarcely be paralleled in any other language.

The Shanscrit alphabet contains 50 letters; and it is one boast of the bramins, that it exceeds all other alphabets in this respect; but it must be observed, that as of their 34 consonants, near half carry combined sounds, and that six of their vowels are merely the correspondent long ones to as many which are short, the advantage

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tage seems to be little more than fanciful. Besides these, they have a number of characters which Mr Halhed calls connected vowels, but which have not been explained by the learned president of the Asiatic Society.

The Shanscrit character used in Upper Hindostan * is said to be the same original letter that was first delivered to the people by Brahma, and is now called *Dieawnāgur*, or the language of angels, which shows the high opinion that the bramins have entertained of that character. Their consonants and vowels are wonderfully, perhaps whimsically, modified and diversified; to enumerate which, in this place, would contribute very little either to the entertainment or instruction of our readers. All these distinctions are marked in the *Beids* (L), and must be modulated accordingly; so that they produce all the effect of a laboured recitative: but by an attention to the music of the chant, the sense of the passage recited equally escapes the reader and the audience. It is remarkable, that the Jews in their synagogues chant the Pentateuch in the same kind of melody; and it is supposed that this usage has descended to them from the remotest ages.

The Shanscrit poetry comprehends a very great variety of different metres, of which the most common are these:

The *munnee hurreneh chbund*, or line of 12 or 19 syllables, which is scanned by three syllables in a foot, and the most approved foot is the anapæst.

The *cābee chbund*, or line of 11 syllables.

The *anūshfofe chbund*, or line of eight syllables.

The poems are generally composed in stanzas of four lines, called *ashlogues*, which are regular or irregular.

The most common *ashlogue* is that of the *anūshfofe chbund*, or regular stanza of eight syllables in each line. In this measure the greatest part of the *Māhābāret* is composed. The rhyme in this kind of stanza should be alternate; but the poets do not seem to be very nice in the observance of a strict correspondence in the sounds of the terminating syllables, provided the feet of the verse are accurately kept.

This short *anūshfofe ashlogue* is generally written by two verses in one line, with a pause between; so the whole then assumes the form of a long distich.

The irregular stanza is constantly called *anyāchbund*, of whatever kind of irregularity it may happen to consist. It is most commonly compounded of the long line *cābee chbund* and the short *anūshfofe chbund* alternately; in which form it bears some resemblance to the most common lyric measure of the English.

To pursue this subject to greater length is scarce possible for us, as matters stand at present. Our readers must suspend their curiosity till more volumes of the *Asiatic Researches* are published, where we make no doubt the whole mystery of this extraordinary language will be plainly unfolded.

Perhaps our readers may feel a curiosity to be informed of the origin of this oriental tongue. If we believe the bramins themselves, it was coeval with the race of man, as was observed towards the beginning of

this section. The bramins, however, are not the only people who ascribe a kind of eternity to their own particular dialect. We find that the Shanscrit in its primitive destination was appropriated to the offices of religion. It is indeed pretended, that all the other dialects spoken in Hindostan were emanations from that fountain, to which they might be traced back by a skilful etymologist. This, we think, is an argument of no great consequence, since we believe that all the languages of Europe, by the same process, may be deduced from any one of those current in that quarter of the globe. By a parity of reason, all the different dialects of Hindostan may be referred to the language in question. Indeed, if we admit the authority of the Mosaic history, all languages whatsoever are derived from that of the first man. It is allowed that the language under consideration is impregnated with Persian, Chaldaic, Phœnician, Greek, and even Latin idioms. This, we think, affords a presumption that the Shanscrit was one of those original dialects which were gradually produced among the descendants of Noah, in proportion as they gradually receded from the centre of population. What branch or branches of that family emigrated to Hindostan, it is not easy to determine. That they were a party of the descendants of Shem is most probable, because the other sects of his posterity settled in that neighbourhood. The sum then is, that the Hindoos were a colony consisting of the descendants of the patriarch Shem.

It appears, however, by almost numberless monuments of antiquity still existing, that at a very early period a different race of men had obtained settlements in that country. It is now generally admitted, that colonies of Egyptians had peopled a considerable part of Hindostan. Numberless traces of their religion occur everywhere in those regions. The very learned president himself is positive, that vestiges of those sacerdotal wanderers are found in India, China, Japan, Tibet, and many parts of Tartary. Those colonists, it is well known, were zealous in propagating their religious ceremonies wherever they resided, and wherever they travelled. There is at the same time even at this day a striking resemblance between the sacred rites of the vulgar Hindoos and those of the ancient Egyptians. The prodigious statues of Salsette and Elephanta fabricated in the Egyptian style; the vast excavations hewn out of the rock in the former; the woolly hair of the statues, their distorted attitudes, their grotesque appearances, their triple heads, and various other configurations—plainly indicate a foreign original. These phenomena suit no other people on earth so exactly as the sons of Mizraim. The Egyptian priests used a sacred character, which none knew but themselves; none were allowed to learn except their children and the choice of the initiated. All these features mark an exact parallel with the bramins of the Hindoos. Add to this, that the dress, diet, lustrations, and other rites of both sects, bore an exact resemblance to each other. Sir William Jones hath justly observed, that the letters of the Shanscrit, stripped of all adventitious appendages, are really the square Chaldaic cha-

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this tongue.

(1) The books which contain the religion of the bramins.

Shanscrit and Bengalese Languages. * 1. ib. iii. epist. 2. et 51.

characters. We learn from Cassiodorus* the following particulars: "The height of the obelisks is equal to that of the circus; now the higher is dedicated to the sun, and the lower to the moon, where the sacred rites of the ancients are intimated by Chaldaic signatures by way of letters." Here then it is plain that the sacred letters of the Egyptians were Chaldaic, and it is allowed that those of the bramins were of the same complexion; which affords a new presumption of the identity of the Shanscrit with those just mentioned.

That the Egyptians had at a very early period penetrated into Hindostan, is universally admitted. Osiris, their celebrated monarch and deity, according to their mythology, conducted an army into that country; taught the natives agriculture, laws, religion, and the culture of the vine, &c. He is said at the same time to have left colonies of priests, as a kind of missionaries, to instruct the people in the ceremonies of religion. Sesostris, another Egyptian potentate, likewise over-ran Hindostan with an army, and taught the natives many useful arts and sciences. When the pastor-kings invaded and conquered Egypt, it is probable that numbers of the priests, in order to avoid the fury of the merciless invaders who demolished the temples and persecuted the ministers of religion, left their native country, and transported themselves into India. These, we should think, were the authors both of the language and religion of the bramins. This dialect, as imported by the Egyptians, was probably of the same contexture with the sacred language of that people, as it appeared many ages after. The Indians, who have always been an inventive and industrious race of men, in process of time cultivated, improved, diversified, and constructed that language with such care and assiduity, that it gradually arrived at that high degree of perfection in which at present it appears.

Had the learned president of the Asiatic Society (M), when he instituted a comparison between the deities of Hindostan on the one side and of Greece and Italy on the other, examined the analogy between the gods of Hindostan and those of Egypt, we think he would have performed a piece of service still more eminent. Having first demonstrated the similarity between the divinities of India and Egypt, he might then have proceeded to investigate the resemblance of the Egyptian and Phœnician with those of Greece and Rome. By this process a chain would have been formed which would have conducted his reader to comprehend at one view the identity of the Zabian worship almost throughout the world.

We foresee that it will be objected to this hypothesis, that all the dialects of Hindostan being clearly reducible to the Shanscrit, it is altogether impossible that it could have been a foreign language. To this we answer, that at the early period when this event is supposed to have taken place, the language of the posterity of the sons of Noah had not deviated considerably from the primitive standard, and consequently the language of the Egyptians and the Hindoos was nearly

the same. The Shanscrit was gradually improved: the language of the vulgar, as is always the case, became more and more different from the original archetype; but still retained such a near resemblance to the mother-tongue as proved the verity of its extraction.

To the preceding account of the Shanscrit language we shall annex a few strictures on the language of Bengal, which we believe is derived from the other, and is in most common use in the southern parts of Hindostan.

Though most of the ancient oriental tongues are read from right to left, like the Hebrew, Chaldaic, Arabic, &c. yet such as properly belong to the whole continent of India proceed from left to right like those of Europe. The Arabic, Persian, &c. are the grand sources whence the former method has been derived; but with these, the numerous original dialects of Hindostan have not the smallest connection or resemblance.

The great number of letters, the complex mode of combination, and the difficulty of pronunciation, are considerable impediments to the study of the Bengal language; and the carelessness and ignorance of the people, and the inaccuracy of their characters, aggravate these inconveniences. Many of their characters are spurious; and these, by long use and the hurry of business, are now almost naturalized into the language.

The Bengal alphabet, like that of the Shanscrit, from which it is derived, consists of 50 letters, whose form, order, and sound, may be learned from Mr Halhed's grammar of the Bengal language. The vowels are divided into long and short, the latter of which are often omitted in writing. Most of the oriental languages are constructed upon the same principle, with respect to the omission of the short vowel. The Hebrews had no sign to express it before the invention of the Masoretic points; in Arabic it is rarely inserted unless upon very solemn occasions, as in the Koran; in the modern Persian it is universally omitted: so to all the consonants in the Shanscrit, the short vowel is an invariable appendage, and is never signified by any diacritical mark; but where the construction requires that the vowel should be dropped, a particular stroke is set under the letter. It is in vain to pretend, in a sketch like this, to detail the sound and pronunciation of these letters: this must be acquired by the ear and by practice.

In the Bengal language there are three genders, as in Greek, Arabic, &c. The authors of this threefold division of genders, with respect to their precedence, appear to have considered the neuter as a kind of residuum resulting from the two others, and as less worthy or less comprehensive than either (see Section of the Greek). The terminations usually applied upon this occasion are *aa* for the masculine, and *ee* for the feminine. In Shanscrit, as in Greek and Latin, the names of all things inanimate have different genders, founded on vague and incomprehensible distinctions: the same is the case with the Bengal.

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Peculiar-
ties of
Shanscrit
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lese nouns.

A Shanscrit noun, on its first formation from the general root, exists equally independent of case as of gender. It is neither nominative, nor genitive, nor accusative; nor is impressed with any of those modifications which mark the relation and connection between the several members of a sentence. In this state it is called an *imperfect* or *crude* noun. To make a nominative of a word, the termination must be changed and a new form supplied. Thus we see, that in the Shanscrit, at least, the nominative has an equal right with any other inflexion to be called a case. Every Shanscrit noun has seven cases, exclusive of the vocative; and therefore comprehends two more than even those of the Latin. Mr Halhed above mentioned details all the varieties of these with great accuracy, to whose Grammar we must refer our readers. The Bengal has only four cases beside the vocative; in which respect it is much inferior to the other.

It would be difficult to account for the variety of words which have been allotted to the class of pronouns by European grammarians. The first and second person are chiefly worthy of observation: these two should seem to be confined to rational and conversable beings only: the third supplies the place of every object in nature; wherefore it must necessarily be endued with a capacity of shifting its gender respectively as it shifts the subject; and hence it is in Shanscrit frequently denominated an adjective. One of the demonstratives *hic* or *ille* usually serves for this purpose; and generally the latter, which in Arabic has no other name than *dhameer el ghaayb*, "the pronoun of the absentee," for whose name it is a substitute.

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pronouns.

In most languages where the verb has a separate inflection for each person, that inflection is sufficient to ascertain the personality; but in Bengal compositions, though the first and second persons occur very frequently, nothing is more rare than the usage of the pronoun of the third; and names of persons are inserted with a constant and disgusting repetition, to avoid, as it should seem, the application of the words *HE* and *SHE*. The second person is always ranked before the first, and the third before the second. The personal pronouns have seven cases, which are varied in a very irregular manner. Leaving these to the Bengalian grammar, we shall proceed to the *verb*.

The Shanscrit, the Arabic, the Greek and Latin verbs, are furnished with a set of inflections and terminations so comprehensive and so complete, that by their form alone they can express all the different distinctions both of persons and time. Three separate qualities in them are perfectly blended and united. Thus by their root they denote a particular act, and by their inflection both point out the time when it takes place and the number of the agents. In Persian, as in English, the verb admits but of two forms, one for the present tense and one for the aorist; and it is observable, that while the past tense is provided for by a peculiar inflexion, the future is generally supplied by an additional word conveying only the idea of time, without any other influence on the act implied by the principal verb. It is also frequently necessary that the different state of the action, as perfect or imperfect, be further ascertained in each of the tenses, past, present, and future. This also, in the learned

languages, is performed by other variations of inflections, for which other verbs and other particles are applied in the modern tongues of Europe and Persia.

Every Shanscrit verb has a form equivalent to the middle voice of the Greek, used through all the tenses with a reflexive sense, and the former is even the most extensive of the two in its use and office: for in Greek the reflexive can only be adopted intransitively when the action of the verb descends to no extraneous subject; but in Shanscrit, the verb is both reciprocal and transitive at the same time.

Neither the Shanscrit, nor the Bengalese, nor the Hindostanic, have any word precisely answering to the sense of the verb *I have*, and consequently the idea is always expressed by *est mihi*; and of course there is no auxiliary form in the Bengal verb correspondent to *I have written*, but the sense is conveyed by another mode. The verb substantive, in all languages, is defective and irregular, and therefore the Shanscrit calls it a *semi-verb*. It is curious to observe that the present tense of this verb, both in Greek and Latin, and also in the Persian, appears plainly to be derived from the Shanscrit. In the Bengalese, this verb has but two distinctions of time, the present and the past; the terminations of the several persons of which serve as a model for those of the same tense in all other verbs respectively.

Verbs of the Bengal language may be divided into three classes, which are distinguished by their penultimate letter. The simple and most common form has an open consonant immediately preceding the final letter of the infinitive. The second is composed of those words whose final letter is preceded by another vowel or open consonant going before it. The third consists entirely of causals derived from verbs of the first and second conjugations. The reader will easily guess at the impossibility of prosecuting this subject to any greater length: we shall therefore conclude with a few remarks collected from the grammar so often mentioned, which we apprehend may be more amusing, if not more instructing.

The Greek verbs in *μι* are formed exactly upon the same principle with the Shanscrit conjugations, even in the minutest particulars. Instances of this are produced in many verbs, which from a root form a new verb by adding the syllable *mi*, and doubling the first consonant. This mode furnishes another presumption of the Egyptian origin of the Shanscrit. Many Greeks travelled into Egypt; many Egyptian colonies settled in Greece. By one or other of those channels the foregoing innovation might have been introduced into the Greek language.

To form the past tense, the Shanscrit applies a syllabic augment, as is done in the Greek: the future has for its characteristic a letter analogous to that of the same tense in the Greek, and it omits the reduplication of the first consonant. It may be added, that the reduplication of the first consonant is not constantly applied to the present tense of the Shanscrit more than to those of the Greek.

The natural simplicity and elegance of many of the Asiatic languages are greatly debased and corrupted by the continual abuse of auxiliary verbs; and this inconvenience has evidently affected the Persian, the Hindostan, and the Bengal idioms.

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Middle
voice of
Shanscrit
verbs.

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Charac-
teristics of the
Bengalese
verbs.

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Chinese
Language.

The infinitives of verbs in the Shanscrit and Bengalese are always used as substantive nouns. Every body knows that the same mode of arrangement very often occurs in the Greek.

In the Shanscrit language, as in the Greek, there are forms of infinitives and of participles comprehensive of time; there are also other branches of the verb that seem to resemble the gerunds and supines of the Latin.

All the terms which serve to qualify, to distinguish, or to augment, either *substance* or *action*, are classed by the Shanscrit grammarians under one head; and the word used to express it literally signifies *increase* or *addition*. According to their arrangement, a simple sentence consists of three members; the *agent*, the *action*, the *subject*: which, in a grammatical sense, are reduced to two; the *noun* and the *verb*. They have a particular word to specify such words as amplify the noun which imports quality, and answers to our *adjectives* or *epithets*: Such as are applied to denote relation or connection, are intimated by another term which we may translate *preposition*.

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Shanscrit
and Benga-
lese ad-
jectives.

The adjectives in Bengalese have no distinction of gender or number; but in Shanscrit these words preserve the distinction of gender, as in the Greek and Latin.

Prepositions are substitutes for cases, which could not have been extended to the number necessary for expressing all the several relations and predicaments in which a noun may be found, without causing too much embarrassment in the form of a declension. Those are too few in the Greek language, which occasions much inconvenience. See sect. *Greek*.

The Latin is less polished than the Greek, and of consequence bears a much nearer resemblance to the Shanscrit, both in words, inflections, and terminations.

The learned are now convinced that the use of numerical figures was first derived from India. Indeed the antiquity of their application in that country far exceeds the powers of investigation. All the numerals in Shanscrit have different forms for the different genders, as in Arabic. There appears a strong probability that the European method of computation was derived from India, as it is much the same with the Shanscrit, though we think the Europeans learned it from the Arabians. The Bengalese merchants compute the largest sums by *fours*; a custom evidently derived from the original mode of computing by the fingers.

The Shanscrit language, among other advantages, has a great variety in the mode of arrangement; and the words are so knit and compacted together, that every sentence appears like one complete word. When two or more words come together *in regimine*, the last of them only has the termination of a case; the others are known by their position; and the whole sentence so connected, forms but one compound word, which is called a *foot*.

SECT. VI. Of the Chinese Language.

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Antiquity
of the Chi-
nese.

THE Chinese, according to the most authentic accounts, are a people of great antiquity. Their situation was such, as, in the earliest ages of the world,

in a great measure secured them from hostile invasion. Their little commerce with the rest of mankind precluded them the knowledge of those improvements which a mutual emulation had often generated among other nations, who were situated in such a manner, with relation to each other, as served to promote a mutual intercourse and correspondence. As China is a large and fertile country, producing all the necessities, conveniences, and even the luxuries of life, its inhabitants were not under the necessity of looking abroad for the two former, nor exposed to the temptation of engaging in foreign commerce, in order to procure the latter. Perfectly satisfied with the articles which their own country produced, they applied themselves entirely to the practice of agriculture and other arts connected with that profession; and their frugality, which they retain even to this day, taught them the lesson of being contented with little: of consequence, though their population was almost incredible, the produce of their soil was abundantly sufficient to yield them a subsistence. Their inventions were their own; and as they borrowed nothing from other people, they gradually began to despise the rest of mankind, and, like the ancient Egyptians, branded them with the epithet of *barbarians*.

Those people had at an early period made amazing proficiency in the mechanical arts. Their progress in the liberal sciences, according to the latest and indeed the most probable accounts, was by no means proportioned. In mathematics, geometry, and astronomy, their knowledge was contemptible; and in ethics, or moral philosophy, the complexion of their laws and customs proves their skill to have been truly superficial. They value themselves very highly at present upon their oratorical talents; and yet of all languages spoken by any civilized people, theirs is confessedly the least improved. To what this untowardly defect is owing, the learned have not yet been able to determine.

The language of the Chinese is totally different from those of all other nations, and bears very strong signatures of an original tongue. All its words are monosyllabic, and compositions and derivations are altogether unknown. Their nouns and verbs admit of no flexions: in short, every thing relating to their idioms is peculiar, and incapable of being compared with any other dialect spoken by any civilized people. Most barbarous languages exhibit something that resembles an attempt towards those diacritical modifications of speech; whereas the Chinese, after a space of 4000 years, have not advanced one step beyond the very first elements of ideal communication. This circumstance, we think, is a plain demonstration that they did not emigrate from that region where the primitive race of mankind is thought to have fixed its residence. Some have imagined, we believe with good reason, that they are a *Tartarian* race, which, breaking off from the main body of that numerous and widely extended people, directed their march towards the south-east. There, falling in with delightful and fertile plains which their posterity now inhabit, they found themselves accommodated so much to their liking, that they dropped all desire of changing their habitations. The country of China is, indeed, so environed with mountains, deserts, and seas, that

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Their lan-
guage an
original
tongue.

Chinese
Language.

it would have been difficult for men in their primitive state to have emigrated into any of the neighbouring regions. Thus secluded from the rest of mankind, the Chinese, in all probability, were left to the strength of their own inventive powers to fabricate a language, as well as the other arts and improvements necessary for the support and convenience of life.

It is indeed obvious that their stock of vocables, when they emigrated from Tartary, was neither ample nor properly accommodated to answer the purposes of the mutual conveyance of ideas. With this slender stock, however, they seem to have been satisfied; for it does not appear that any additions were afterwards made to that which was originally imported. Instead of framing a new race of terms by compounding their primitive ones; instead of diversifying them by inflections, or multiplying them by derivatives, as is done in every other language; they rather chose to retain their primitive words, and by a variety of modifications, introduced upon their orthography or pronunciation, to accommodate them to a variety of significations. Were it possible to scrutinize all the Tartarian dialects, and to reduce them to their primitive monosyllabic character, perhaps the original language of the Chinese might be investigated and ascertained. We know that attempts have been made to compare it with some of the other Asiatic languages, especially the *Hebrew*: This labour has, however, proved unsuccessful, and no primeval identity has been discovered. Before this comparison could be instituted with the most distant prospect of success, the language last mentioned must be stripped of all its adventitious qualities; and not only so, but it must be reduced to the monosyllabic tone, and then contrasted with the Chinese monosyllables; an undertaking which we are persuaded would not be readily executed. After all, we are convinced that no resemblance of any importance would be discovered.

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Process of
its fabrication.

The Chinese language must then, in our opinion, have been a Tartarian dialect, as the people themselves were colonists from Tartary. We have observed above, that those people have not hitherto found out the art of composition of words. This is the more surprising, when we consider that, in the characters which form their written language, they employ many compositions. For example, the character by which they represent *misfortune*, is composed of one hieroglyphic which represents a *house*, and another which denotes *fire*; because the greatest misfortune that can befall a man is to have his house on fire. With respect to the language which they use in speech, though they very often employ many words to express one thing, yet they never run them together into one word, making certain changes upon them that they may incorporate the more conveniently, but always preserve them entire and unaltered.

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Paucity of
its words

The whole number of words in the Chinese language does not exceed 1200: the nouns are but 326. It must certainly appear surprising, that a people whose

manners are so highly polished and refined, should be able to express so many things as must of necessity attend such a course of life by so small a number of words, and those too monosyllables. The difficulties which attend this singular mode must be felt almost every instant; circumstances which, according to the ordinary course of things, should have induced them to attempt both an augmentation of the number of their words and an extension of those which they had by composition and derivation. We learn from Du Halde† that the Chinese have two different dialects: * *Hist. of China*, vol. ii. the one vulgar, which is spoken by the vulgar, and varies according to the different provinces; the other is called the *Mandarin language*, and is current only among the learned. The latter is properly that which was formerly spoken at court in the province of *Kiang-nan*, and gradually spread among the polite people in the other provinces. Accordingly, this language is spoken with more elegance in the provinces adjoining to *Kiang-nan* than in any other part of the kingdom. By slow degrees it was introduced into all parts of the empire, and consequently became the universal language.

It then appears that the modern language of China was originally the court dialect, and utterly unknown to the bulk of the people. From this circumstance we think it may fairly be concluded that this dialect was deemed the royal tongue, and had been fabricated on purpose, to distinguish it from the vulgar dialects. We learn from Heliodorus, that the § *Ethiop.* lib. vi. Ethiopians had a royal language which was the same with the sacred idiom of the Egyptians. This Mandarin tongue was originally an artificial dialect fabricated with a view to enhance the majesty of the court, and to raise its very style and diction above that of the rest of mankind. The Chinese, a wonderfully inventive people, might actually contrive a language of that complexion, with an intention to render it obscure and enigmatical (N). Such a plan would excite their admiration, and would at the same time greatly exceed their comprehension. In process of time, when the Chinese empire was extended, the Mandarines who had been brought up at court, and understood nothing of the provincial dialects, found it convenient to have the most eminent persons in every province taught the language employed by themselves, in order to qualify them for transacting the affairs of government with them in a language which both understood. By this means the royal dialect descended to the vulgar, and in process of time became universal. The Tartar dialect formerly in use vanished; only a few vestiges of it remained; which gradually incorporating with the royal language, occasioned the variation of provincial tongues above-mentioned.

We are therefore clearly of opinion, that the modern language of the Chinese was deduced from the original Mandarine, or court dialect, and that this last was an artificial speech fabricated by the skill and ingenuity of that wonderful people. The learned have long held it up as the primary dialect, because, say they, it bears

(N) An attempt of this nature, among a people like the Chinese, is by no means improbable; nor is its success less probable. For a proof of this, we need only have recourse to Bishop Wilkins's *Artificial Language*, and Palsmanazar's *Dictionary of the language of Formosa*.

^{Chinese Language.} bears all the signatures of an original unimproved language. In our opinion, nothing appears more ingeniously artificial. It is universally allowed that, in its structure, arrangement, idioms, and phraseology, it resembles no other language. Is not every learned man now convinced that all the Asiatic languages yet known, discover unequivocal symptoms of their cognation and family resemblance? The Ethiopians, Chaldeans, Arabians, Persians, Egyptians, Hebrews, Phœnicians, the Brahmans, Bengalese, the Hindoos bordering upon China, all speak only different dialects of one language, varying from the original in dialect only, some in a greater some in a lesser degree: why should the Chinese alone stand altogether insulated and unallied?

The languages of the North all wear congenial features. The Tartar, or Tatar dialects of every clan, of every canton, of every denomination, exhibit the most palpable proofs of a near affinity: the Gothic and Slavonian dialects, which pervade a great part of Europe and some parts of Asia, are obviously brethren, and may easily be traced up to an Asiatic original. Even some of the American jargon dialects contain vocables which indicate an Asiatic or European original. Our readers, we flatter ourselves, will agree with us, that had the language of the Chinese been the original language, a resemblance must have still existed between it and its descendants. If it had originated from any other language, it would have retained some characteristic features of its parent archetype. As neither of these are to be found in the fabric of the language under consideration, the conclusion must be, that it is a language entirely different from all other tongues; that it is constructed upon different principles, descended from different parents, and framed by different artists.

The Chinese themselves have a common and immemorial tradition, that their language was framed by *Tao* their first emperor, to whom they attribute the invention of every thing curious, useful, and ornamental. Traditional history, when it is ancient, uniform, and universal, is generally well founded: upon this occasion we think the tradition above-mentioned may be fairly admitted as a collateral evidence.

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^{A proof of its artificial structure.} The paucity of vocables contained in this singular language, we think another presumption of its artificial texture. The Chinese *Onomatheta* would find it an arduous task to devise a great number of new terms, and would therefore rest satisfied with the smallest number possible. In other languages we find the like economy was observed. Rather than fabricate new words, men chose sometimes to adapt old words to new, and, upon some occasions, even to contrary significations. To spare themselves the trouble of coining new terms, they contrived to join several old ones into one; whence arose a numerous race of compounds. Derivatives too were fabricated to answer the same purpose. By this process, instead of creating new vocables, old ones were compounded, diversified, deflected, ramified, metamorphosed, and tortured into a thousand different shapes.

The Greek is deservedly esteemed a rich and copious language; its radical words have been curiously traced by several learned men, who, after the most laborious and exact scrutiny, have found that they do not amount

to more than 300. The Sanscrit language is highly compounded; its radical terms, however, are very few in number. Upon the whole, we think we may conclude, that the more any language abounds in compounds and derivatives, the smaller will be the number of its radical terms. The Arabic admits of no composition, and of consequence its words have been multiplied almost *in infinitum*; the Sanscrit, the Persian, and the Greek, abound with compounds, and we find their radicals are few in proportion.

There are, we think, three different methods which may be employed in order to enrich and extend the range of a language. 1st, By fabricating a multitude of words; the plan which has been pursued by the Arabs. 2d, By framing a multitude of compounds and derivatives; the artifice employed by the Greeks and the authors of the Sanscrit. 3d, By varying the signification of words without enlarging their number; the method practised by the Chinese and their colonists. The Arabians, we think, have shown the most fertile and inventive genius, since they have enriched their language by actually creating a new and a most numerous race of words. The fabricators of the Sanscrit and the collectors of the Greek have exhibited art, but comparatively little fertility of genius. Leaving, therefore, the Arabians, as in justice we ought, masters of the field in the contest relating to the formation of language, we may range the Greek and Sanscrit on the one side, and the Chinese on the other; and having made this arrangement, we may attempt to discover on which side the largest proportion of genius and invention seems to rest.

The Greek and Sanscrit (for we have selected them as most highly compounded) exhibit a great deal of art in modifying, arranging, and diversifying their compounds and derivatives, in such a manner as to qualify them for intimating complex ideas; but the Chinese have performed the same office by the help of a race of monosyllabic notes, simple, inflexible, invariable, and at the same time few in number. The question then comes to be, whether more art is displayed in new-modelling old words by means of declensions, conjugations, compounds, and derivatives; or by devising a plan according to which monosyllabic radical terms, absolutely invariable, should, by a particular modification of sound, answer all the purposes performed by the other. The latter appears to us much more ingeniously artificial. The former resembles a complicated machine composed of a vast number of parts, congenial indeed, but loosely connected; the latter may be compared to a simple, uniform engine, easily managed, and all its parts properly adjusted. Let us now see in what manner the people in question managed their monosyllabic notes, so as to qualify them for answering all the purposes of speech.

Though the number of words in the Chinese language does not amount to above 1200; yet that small number of vocables, by their artificial management, is sufficient to enable them to express themselves with ease and perspicuity upon every subject. Without multiplying words, the sense is varied almost *in infinitum* by the variety of the accents, inflections, tones, aspirations, and other changes of the voice and enunciation; circumstances which make those who do not

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¹¹³
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¹¹⁴
That adopted by the Chinese.

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thoroughly understand the language frequently mistake one word for another. This will appear obvious by an example.

The word *teou* pronounced slowly, drawing out the *v* and raising the voice, signifies a *lord* or *master*. If it is pronounced with an even tone, lengthening the *v*, it signifies a *hog*. When it is pronounced quick and lightly, it imports a *kitchen*. If it be pronounced in a strong and masculine tone, growing weaker towards the end, it signifies a *column*.

By the same economy, the syllable *po*, according to the various accents, and the different modes of pronunciation, has eleven different significations. It signifies *glass*, *to boil*, *to winnow rice*, *wise or liberal*, *to prepare*, *an old woman*, *to break or cleave*, *inclined*, *a very little*, *to water*, *a slave or captive*. From these examples, and from almost numberless others which might be adduced, it is abundantly evident that this language, which at first sight appears so poor and confined, in consequence of the small number of the monosyllables of which it is composed, is notwithstanding very copious, rich, and expressive.

Again, the same word joined to various others, imports a great many different things; for example *mou*, when alone, signifies a *tree*, *wood*; but when joined with another word, it has many other significations. *Mou leao*, imports "wood prepared for building;" *mou lan*, is "bars, or wooden grates;" *mou bia*, "a box;" *mou sang*, "a chest of drawers;" *mou tsang*, "a carpenter;" *mou eul*, "a mushroom;" *mou nu*, "a sort of small orange;" *mou sing*, "the planet Jupiter;" *mou mien*, "cotton," &c. This word may be joined to several others, and has as many different significations as it has different combinations.

Thus the Chinese, by a different arrangement of their monosyllables, can compose a regular and elegant discourse, and communicate their ideas with energy and precision; nay even with gracefulness and propriety. In these qualities they are not excelled either by the Europeans or Asiatics, who use alphabetical letters. In fine, the Chinese so naturally distinguish the tones of the same monosyllable, that they comprehend the sense of it, without making the least reflection on the various accents by which it is determined.

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Consequences of this method on pronunciation.

We must not, however, imagine, as some authors have related, that those people cant in speaking, and make a sort of music which is very disagreeable to the ear; these different tones are pronounced so curiously, that even strangers find it difficult to perceive their difference even in the province of *Kiang-nan*, where the accent is more perfect than in any other. The nature of it may be conceived by the guttural pronunciation in the Spanish language, and by the different tones that are used in the French and Italian: these tones are almost imperceptible; they have, however, different meanings, a circumstance which gave rise to the proverb, that *the tone is all*.

If the fineness and delicacy of their tones are such as to be scarce perceptible to a stranger, we must suppose that they do not rise high, but only by small intervals; so that the music of their language must somewhat resemble the music of the birds, which is within a small compass, but nevertheless of great variety of notes. Hence it will follow, that strangers

will find it very difficult, if not impossible, to learn this language; more especially if they have not a delicate ear and a flexible voice, and also much practice. The great difference then between the Chinese and Greek accents consists in this, that the Greeks had but two accents, the grave and acute, distinguished by a large interval, and that not very exactly marked: for the acute, though it never rises above a fifth higher than the grave, did not always rise so high, but was sometimes pitched lower according to the voice of the speaker. The Chinese must have many more accents, and the intervals between them must be much smaller, and much more carefully marked; for otherwise it would be impossible to distinguish them. At the same time, their language must be much more musical than the Greek, and perhaps more so than any language ought to be; but this becomes necessary for the purposes above-mentioned. Du Halde is positive, that notwithstanding the perpetual variation of accents in the Chinese tongue, and the almost imperceptible intervals between these tones, their enunciation does not resemble singing: many people, however, who have resided in China, are equally positive that the tone with which they utter their words does actually resemble *canting*; and this, when we consider the almost imperceptible intervals by which they are perpetually raising and lowering the tone of their voice, appears to us highly probable.

As the people of whose language we are treating at present communicate a variety of different significations to their monosyllabic words by their different accentuation, so they employ quantity for the very same purpose. By lengthening or shortening the vowels of their words, they employ them to signify very different things. The same they perform by giving their words different aspirations, as likewise by sounding them with different degrees of roughness and smoothness; and even sometimes by the different motion, posture, or attitude, with which their enunciation is accompanied. By these methods of diversifying their monosyllables (says Du Halde), they make 330 of them serve all the purposes of language, and these too not much varied in their termination; since all the words in that language either terminate with a vowel or with the consonant *n*, sometimes with the consonant *g* annexed.

From this account, we think it is evident that the Chinese, by a wonderful exertion of ingenuity, do, by different tones and prosodical modifications, by means of a very inconsiderable number of words, all invariable radicals, actually perform all that the most polished nations have been able to achieve by their compounds, derivatives, &c. diversified by declensions, conjugations, and flexions of every kind; circumstances which, in our opinion, reflect the greatest honour on their inventive powers.

With respect to the grammar of this language, as Grammar it admits of no flexions, all their words being indeclinable, their cases and tenses are all formed by particles. They have no idea of genders; and even the distinction of numbers, which in almost all other languages, even the most unimproved, is marked by a particular word, is in the Chinese only indicated by a particle. They have only the three simple tenses, namely, the past, present, and future; and for want of different

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different terminations, the same word stands either for the verb or the verbal substantive, the adjective or the substantive derived from it, according to its position in the sentence.

The Chinese language being composed of monosyllables, and these indeclinable, can scarce be reduced to grammatical rules: we shall, however, attempt to lay before our readers as much of the texture of that singular dialect as may enable them to form some vague idea of its genius and constitution. We shall begin with the letters, and proceed regularly to the remaining parts as they naturally succeed each other.

117 Chinese letters or characters

The art of joining the Chinese monosyllables together is extremely difficult, and requires a very long and laborious course of study. As they have only figures by which they can express their thoughts, and have no accents in writing to vary the pronunciation, they are obliged to employ as many different figures or characters as there are different tones, which give so many different significations to the same word. Besides, some single characters signify two or three words, and sometimes even a whole period. For example, to write these words, *good morrow, Sir*, instead of joining the characters which signify *good* and *morrow* with that of *Sir*, a different character must be used, and this character alone expresses these three words. This circumstance greatly contributes to multiply the Chinese characters.

This method of joining the monosyllables is indeed sufficient for writing so as to be understood; but it is deemed trifling, and is used only by the vulgar. The style that is employed, in order to shine in composition, is quite different from that which is used in conversation, though the words are in reality the same. In writings of that species, a man of letters must use more elegant phrases, more lofty expressions, and the whole must be dignified with tropes and figures which are not in general use, but in a peculiar manner adapted to the nature of the subject in question. The characters of Cochin china, of Tong-king, of Japan, are the same with those of the Chinese, and signify the same things; though, in speaking, these nations do not express themselves in the same manner: of consequence the language of conversation is very different, and they are not able to understand each other; while, at the same time, they understand each other's written language, and use all their books in common.

The learned must not only be acquainted with the characters that are employed in the common affairs of life, but must also understand their various combinations, and the numerous and multiform dispositions and arrangements which of several simple strokes make the compound characters. The number of their characters amounts to 80,000; and the man who knows the greatest number of them is of course the most learned. From this circumstance we may conclude, that many years must be employed to acquire the knowledge of such a prodigious number of characters, to distinguish them when they are compounded, and to remember their shape and import. After all, a person who understands 10,000 characters may express himself with tolerable propriety in this language, and may be able to read and understand a great number of books. The generality of their learned men do not understand above 15,000 or 20,000, and few of their doctors have at-

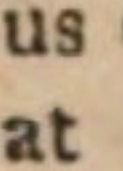
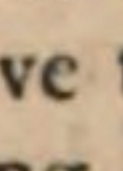
118 Exceedingly numerous,

tained to the knowledge of above 40,000. This prodigious number of characters is collected in their great vocabulary called *Hai-pien*. They have radical letters, which show the origin of words, and enable them to find out those which are derived from them: for instance, the characters of mountains, of trees, man, the earth, of a horse, under which must be sought all that belongs to mountains, trees, man, &c. In this search one must learn to distinguish in every word those strokes or figures which are above, beneath, on the sides, or in the body of the radical figure.

Clemens Alexandrinus (see Section *Chaldean*, &c.) informs us, that the Egyptians employed three sorts of characters: The first was called the *epistolary*, which was used in writing letters; the second was denominated *sacred*, and peculiar to the sacerdotal order; the last *hieroglyphical*, which was appropriated to monumental inscriptions and other public memorials. This mode of representation was twofold: one, and the most simple, was performed by describing the picture of the object which they intended to represent, or at least one that resembled it pretty nearly; as when they exhibited the sun by a circle and the moon by a crescent: the other was properly symbolic; as when they marked *eternity* by a serpent with his tail in his mouth, the *air* by a man clothed in an azure robe studded with stars, &c.

The Chinese, in all probability, had the same variety of characters. In the beginning of their monarchy, they communicated their ideas by drawing on paper the images of the objects they intended to express; that is, they drew the figure of a bird, a mountain, a tree, waving lines, to indicate birds, mountains, forests, rivers, &c.

There were, however, an infinite number of ideas to be communicated, whose objects do not fall under the cognizance of the senses; such as the soul, the thoughts, the passions, beauty, deformity, virtues, vices, the actions of men and other animals, &c. This inconvenience obliged them to alter their original mode of writing, which was too confined to answer that purpose, and to introduce characters of a more simple nature, and to invent others to express those things which are the objects of our senses.

These modern characters are, however, truly hieroglyphical, since they are composed of simple letters which retain the signification of the primitive characters. The original character for the sun was a circle, thus ; this they called *ga*: They now represent that luminary by the figure , to which they still give the original name. But human institutions having annexed to these last framed characters the very same ideas indicated by the original ones, the consequence is, that every Chinese letter is actually significant, and that it still retains its significancy, though connected with others. Accordingly the word *t'ai*, which imports "misfortune, calamity," is composed of the letter *mien* "a house," and the letter *ho* "fire;" so that the symbolical character for misfortune is the figure of a house on fire. The Chinese characters, then, are not simple letters without any signification, like those of the Europeans and other Asiatics; but when they are joined together, they are so many hieroglyphics, which form images and express thoughts.

119 And truly hieroglyphical.

Upon the whole, the original characters of the Chi-

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nese were real pictures (see Section of the *Egyptian* language); the next improvement was the symbolical character; the third and last stage is the present mode, in which artificial signs have been fabricated, in order to represent such thoughts or ideas as could not be represented by one or other of the methods above described. Du Halde, Vol. II. p. 400, *et seq.* has furnished us with rules for pronouncing the Chinese vowels and consonants; a piece of information which, we apprehend, would be of little consequence to our readers, and which we shall therefore pass over, and proceed to give a brief account of their grammar. As the whole language is composed of monosyllables, and these indeclinable, its grammatical structure must be simple and obvious: we shall only mention what to us appears singular and important.

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Peculiarities of the
Chinese
parts of
speech.

In the Chinese language there is no diversity of genders or cases, and of consequence no declensions. Very often the noun is not distinguished from the verb; and the same word which in one situation is a substantive, in another may become an adjective, and even a verb.

The adjective always goes before the substantive; but if it follows it, it becomes a substantive.

The cases and numbers are known only by the composition. The plural number is distinguished by the particle *men*, which is common to all nouns; but when the noun is preceded by some word that signifies number, the particle *men* is not annexed.

The Chinese genitive, both singular and plural, when it comes after nouns, is often made by *ti*; and there is no other case in that language. The same particle is sometimes placed after pronouns, as if they were derivatives.

The comparative degree is formed by adding the particle *keng*, which is always set before the noun, and signifies *much*. The particle *to* is sometimes used, which likewise imports *much*.

The Chinese have only three personal pronouns, *ngo* "I," *ni* "thou," and *ta* "he:" these become plural by adding the syllable *men*. They are made possessive by adding the syllable *ti*, as *ngo ti* "mine," *ni ti* "thine," *ta ti* "his." The patronymics are formed by putting the name of the city, country, &c. after the pronoun: *chon* is the pronoun relative *who*, *what*, *which*.

Chinese verbs have only three tenses, the preterperfect, the present, and the future. When there is no particle added to the verb, it is the present: the preterperfect is made by adding the particle *leao*: to distinguish the future tense they use the particle *tsiang* or *hoei*; and these are all the varieties incident to their verbs.

The Chinese language has no words that are properly adverbs; they only become so by custom, or by the place they possess in discourse. They are often obliged to employ several words to express the adverbs of other languages: they have none that are demonstrative, or proper for calling or exhorting; but in their stead they are obliged to use nouns and verbs.

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Their numerals.

Perhaps our readers may wish to know the Chinese numerals; and may imagine that they bear a resemblance to those of the European or other Asiatic dialects. In this, however, they will be disappointed.

They stand as follows:

<i>Y</i>	One
<i>Eut</i>	Two
<i>San</i>	Three
<i>Sacc</i>	Four
<i>Ou</i>	Five
<i>Lou</i>	Six
<i>Tsi</i>	Seven
<i>Po</i>	Eight
<i>Kieu</i>	Nine
<i>Che</i>	Ten
<i>Che y</i>	Eleven
<i>Eut che</i>	Twelve
<i>San che</i>	Thirteen
<i>Pe</i>	One hundred
<i>Eut pe</i>	Two hundred
<i>Y tsien</i>	One thousand
<i>Y ouan</i>	Ten thousand
<i>Che ouan</i>	Twenty thousand
<i>Eut ouan</i>	One hundred thousand
<i>Che ouan</i>	Two hundred thousand
<i>Y pe ouan</i>	One million.

There are a great many particles proper to numbers in the Chinese language: they are frequently used, and in a way peculiar to it; for every numeral has a particle importing the object to which it is attached. Thus *co* is used for man, and *y co* for a woman, &c. *hoei* is used for illustrious men; *tche* or *tchi* is used for ships, dogs, hens; *mei* is used for pearls and precious things; *pen* is used for books; *teng* is appropriated to oxen and cows; *too* is used for letters and little bundles of paper; *oo* is employed for corn and pulse. Those distinctions indicate a language manufactured on purpose to be employed by people who were too high and too haughty to converse with the vulgar.

The style of the Chinese, in their elaborate compositions, is mysterious, concise, and allegorical, after the eastern manner. It is often obscure to those who do not understand the language thoroughly; and it requires a considerable degree of skill to avoid mistakes in reading an author of elegance and sublimity. Their writers express a great deal in few words; and their expressions are lively, full of spirit, intermingled with bold comparisons and lofty metaphors. They affect to insert in their compositions many sentences borrowed from their five canonical books; and as they compare their books to pictures, so they liken these quotations to the five principal colours employed in painting; and in this their eloquence chiefly consists.

They prefer a beautiful character to the most finished picture; and nothing is more common than to see a single page covered with old characters, if they happen to be fair and elegant, sold at a very high price. They honour their characters in the most common books; and when they happen to light by chance upon a printed leaf, they gather it up with the greatest care and respect.

In China there are three varieties of language; that of the common people, that of the people of fashion, and that employed in writing books. Though the first is not so elegant as either of the other two, it is not however inferior to our European languages; though those who are but superficially acquainted with

Chinese Language. the Chinese may, in fact, imagine it uncouth and barbarous. This low and rude language is pronounced and written many different ways, as is generally the case in other countries.

But a more polished, and at the same time a much more energetic, language, is employed in an almost infinite number of novels; some perhaps true, but many more the vehicles of fiction. These are replete with lively descriptions, characters highly finished, morality, variety, wit, and vivacity, in such a degree as to equal in purity and politeness the most celebrated authors of Europe. This was the language of the Mandarines; and though exquisitely beautiful in its kind, was still inferior to the language of books. This last might be styled the *hyper sublime*; and of this there are several degrees and intervals before an author can arrive at what they call the language of the *kings*. This mode of writing cannot be well understood without looking upon the letters; but when understood, it appears easy and flowing. Each thought is generally expressed in four or six characters: nothing occurs that can offend the nicest ear; and the variety of the accents with which it is pronounced produces a soft and harmonious sound.

The difference between the *king* and their other books consists in the difference of the subjects upon which they are written. Those of the former are always grand and sublime, and of course the style is noble and elevated: those of the latter approach nearer to the common affairs and events of life, and are of consequence detailed in the Mandarin tongue. In writing on sublime subjects no punctuations are used. As these compositions are intended for the learned only, the author leaves to the reader to determine where the sense is complete; and those who are well skilled in the language readily find it out.

The copiousness of the Chinese language is in a great measure owing to the multitude of its characters. It is likewise occasioned, in some degree, by the difference of their signification, as also by the artificial method of their conjunction, which is performed most commonly by uniting them two and two, frequently three and three, and sometimes four and four.

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Their books numerous and bulky. Their books are very numerous and bulky, and of course exceedingly cumbrous. A dictionary of their language was compiled in this century. It consisted of 95 large volumes. An appendix was annexed of 25 volumes. Their other books are voluminous in proportion. The Chinese, one may say, are a nation of learned men. Few people of rank neglect the belles lettres; for ignorance in a man of any degree of eminence is deemed an indelible stain on his character.

For their manner of writing, the implements with which they write, and the materials upon which they draw their characters, we must remit our readers to the article *WRITING*. It would, we believe, afford our readers some pleasure, could we discover and explain the reasons which have hitherto prevented the Chinese from adopting the letters employed from time immemorial by the other nations of Europe and Asia.

The Chinese have ever looked upon themselves as greatly superior to the rest of mankind. In ancient times they entertained such contemptible notions of foreigners, that they scorned to have any further com-

Chinese Language.
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Obstacles to their improvement in science and literature. merce with them than to receive their homage. They were indeed, at a very early period, highly revered by the Indians, Persians, and Tartars. In consequence of this veneration, they looked upon themselves as the favourites of heaven. They imagined they were situated in the middle of the earth, in a kind of paradise, in order to give laws to the rest of mankind. Other men they looked upon with contempt and disdain, and deemed them deformed in body and defective in mind, cast out into the remote corners of the world as the dross and refuse of nature. They boasted that themselves only had received from God rational souls and beautiful bodies, in order to qualify them for being sovereigns of the species.

Such are the sentiments of the Chinese; and with such sentiments it is by no means surprising that their improvements in *language*, in *writing*, and other appendages of the belles lettres, have not been proportioned to their progress in mechanics. When people are once fully persuaded that they have already arrived at the summit of perfection, it is natural for them to sit down contented, and solace themselves with the idea of their own superior attainments. The Chinese had early entertained an exalted opinion of their own superiority to the rest of mankind; and therefore imagined that they had already carried their inventions to the *ne plus ultra* of perfection; the consequence was, that they could make no exertions to carry them higher.

The Chinese, for the space of 3000 years, had almost no intercourse with the rest of mankind. This was the consequence of their insulated situation.—They, of course, *compared themselves with themselves*; and finding that they excelled all their barbarian neighbours, they readily entertained an opinion that they excelled all the rest of mankind in an equal proportion. This conceit at once stifled the emotions of ambition, and deprived them of all opportunities of learning what was going forward in other parts of the world.

They despised every other nation. People are little disposed to imitate those whom they despise; and this perhaps may be one reason why they are at this day so averse from adopting the European inventions.

A superstitious attachment to the customs of the ancients, is the general character of the Asiatic nations. This is evidently a kind of diacritical feature among the Chinese. The institutions of *Fohi* are looked up to among them with equal veneration as those of *Thoth* were among the Egyptians. Among the latter, there was a law which made it capital to introduce any innovation into the music, painting, or statuary art, instituted by that legislator. We hear of no such law among the former; but custom established, and that invariably, for a space of 3000 years, might operate as forcibly among them as a positive law did among the people first mentioned. An attachment to ancient customs is often more powerful and more coercive than any law that can be promulgated and enforced by mere human authority. These reasons, we think, may be assigned as the impediments to the progress of the Chinese in the belles lettres, and perhaps in the cultivation of the other sciences.

Though the language of the Chinese is confessedly different from all the other known languages in its

Chinese
Language.
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Chinese
words
found in
various o-
ther lan-
guages.

character and construction, it contains, however, a great number of words evidently of the same origin with those which occur in other dialects, used by people who, according to the natural course of things, could never have been connected with that remote country. A few of those we shall produce before we conclude this section. We shall begin with the import of the name *China*.

China, or, as the orientals write it, *Sin*, is perhaps the Latin *sinus*, "the bosom, the heart, the middle." The Chinese actually imagine that their country is situated in the very middle of the earth, and of consequence call it *Cham*, "the middle, the heart;" a denomination which exactly suits their opinion.

Tu, in Chinese, intimates every thing that falls under the cognizance of the senses, every thing that strikes the sight; in Latin, *tueor*.

Ta, a table, a plank, a figure that renders every thing sensible: 2. To see, to look upon, to appear; Greek *τα* *ταω*, whence *τινω*, *tendo*.

Tue, to examine attentively, to inspect carefully.

Tui, the most apparent, chief, principal, first; 2. Lightning, thunder.

Teu, a sign by which to know one, letter of acknowledgment. All these ideas are contained in the Hebrew *ת*, *thu*, *signum*, which we believe has produced the Egyptian *theuth*, the god or godlike man who invented letters, geometry, music, astronomy, &c.

Tai, a dye, a theatre; Greek of old *Θια*, then *Θιαμα*, "to see, to look."

Tam, Latin *tantum*, "so much."

Tan, land, country, region, a syllable annexed to the end of a great number of words. *Aqui tan*, *Aquitania*, "a land of water;" *Mauri tan*, *Mauritania*, "the land of the Moors." The orientals prefix *s*, whence *Farfi stan*, *Farfistan*, "the land or country of the Persians;" *Chusi stan*, *Chustan*, "the country of Chuz;" *Turque stan*, *Turquestan*, "the land of the Turks."

Ti, a chief, an emperor, a title of dignity; whence the Greek *τιω* "to honour;" hence, too, the word *di*, "bright, glorious;" whence *Δις* "Jupiter," *Διός* "divine;" the Latin *Dius*, now *Deus*, "God," and *Divus*, with the digamma *Æolicum* inserted; the Celtic *Dhia*, &c. It signified originally "bright, glorious," and was an epithet of the Sun.

Tum, Latin *tumeo*, "to swell."

Liven, "to love;" Hebrew *לב*, *leb*, "the heart;" Latin, *libet*. This word pervades all the dialects of the Gothic tongue, still retaining either the same or a nearly analogous signification.

Li, "letters;" Latin, *lino*, "to daub," as the Chinese actually do in forming their letters.

Lo, "to contain, that which contains;" Celtic, *log*; French, *loge*, *logis*, *loger*.

Lim, "a rule;" hence Latin, *linea*, "a line."

Su, "with;" Greek, *συ*, "with;" Celtic, *cyn*, *cym*; whence Latin, *cum*, *con*, &c.

Xim, "very high, elevated, sacred, perfect;" Latin, *eximius*.

Sin, "the heart;" Persian, *Sin*, "the heart."

Sien, "chief, first;" Celtic, *can*, *cean*, *san*, "the head;" metaphorically, the chief, the first, the principal; Thibet, "sen, or ken, "great, elevated;" Arabic, *same*, "to be elevated or raised."

Sim, or *Sing*, "a constellation, a star, an element;" Greek *σημειον*, *σημα*; Latin, *signum*.

Sie, "a man of learning;" Goth. Sax. Engl. "see; to see, seer."

Cem, "a priest;" Hebr. *coben*; Syr. *con*; Egypt. *can*, *cun*.

Quin, "a king;" Celtic, *ken*, *kend*, "head, chief;" Gothic, *koanig*; Germ. Flem. Eng. *king*, also *queen*.

Hu, "a door;" Goth. Germ. Engl. *hus*, *hausen*, *hause*.

Min, "a river;" Welch, *men*, "the water of a river;" Latin, *mano*, "to flow," and perhaps *amoenus*, "pleasant."

Hen, "hatred;" Greek, *αινος* "cruel, horrible, odious."

Kiven, "a dog;" Greek *κυων*, *id*.

Ven, "beauty;" Latin, *Venus*, *venustas*; Iceland. Swed. *wen*, "pleasant;" Scotch, *winsome*.

Han, "the soul, breath;" Greek, *ανμος*; Latin, *anima*, *animus*.

To these instances of the analogy between the Chinese language and those of the other people of Asia and Europe many more might be added; but the preceding, it is hoped, will serve as a specimen, which is all that can be expected from an inquiry of the nature of the present.

SECT. VII. Of the Greek Language.

BEFORE we enter upon the consideration of the essential and constituent parts of this noble language, we must beg leave to settle a few preliminaries, which, we trust, will serve to throw some light upon many points which may come under consideration in the course of the following disquisition.

The Greeks, according to the most authentic accounts, were descended of Javan or Jon, the fourth son of Japhet, the eldest son of the patriarch Noah. The Scriptures of old, and all the orientals to this day, call the Greeks *Jonim*, or *Jaunam*, or *Javenoth*. We have already observed, in the beginning of the article concerning the Hebrew language, that only a few of the descendants of Ham, and the most profligate of the posterity of Shem and Japhet, were concerned in building the tower of Babel. We shall not now resume the arguments then collected in support of that position; but proceed to investigate the character of that branch of the posterity of Javan which inhabited Greece and the neighbouring regions.

At what period the colonists arrived in these parts cannot be certainly determined; nor is it of great importance in the question before us. That they carried along with them into their new settlements the language of Noah and his family, is, we think, a point that cannot be controverted. We have endeavoured to prove that the Hebrew, or at least one or other of its sister-dialects, was the primæval language of mankind. The Hebrew, then, or one of its cognate branches, was the original dialect of the Jonim or Greeks.

Be that as it may, before these people make their appearance in profane history, their language deviates very widely from this original archetype. By what means, at what period, and in what length of time this

^{Greek Language.} this change was introduced, is, we believe, a matter not easy to be elucidated. That it was progressive, is abundantly certain both from the rules of analogy and reason.

The colonies, which traversed a large tract of country before they arrived at their destined settlements, must have struggled with numberless difficulties in the course of their peregrinations. The earth, during the periods which immediately succeeded the universal deluge, must have been covered with forests, intersected with swamps, lakes, rivers, and numberless other impediments. As the necessities, and a few of the conveniences of life, will always engross the first cares of mankind, the procuring of these comforts will, of necessity, exclude all concern about arts and sciences which are unconnected with these pursuits. Hence we think it probable, that most of those colonies which migrated to a very great distance from the plains of Shinar, which we believe to have been the original seat of mankind, in a great measure neglected the practice of the polite but unnecessary modes of civilization which their ancestors were acquainted with, and practised before the era of their migration. Certain it is, that those nations which continued to reside in the neighbourhood of that centre of civilization, always appear in a cultivated state; while, at the same time, the colonists who removed to a considerable distance appear to have sunk into barbarism, at a period more early than the annals of profane history can reach.— This appears to have been the situation of the primary inhabitants of Greece. Their own historians, the most partial to their own countrymen that can well be imagined, exhibit a very unpromising picture of their earliest progenitors. Diodorus Siculus, in delineating the character of the original men, we believe sketches his draught from the first inhabitants of Greece †. He represents them as absolute savages, going out in small parties to make war upon the wild beasts of the field, which (according to him) kept them in continual alarm. “Necessity obliged them to band together for their mutual security; they had not sagacity enough to distinguish between the wholesome and poisonous vegetables; nor had they skill enough to lay up and preserve the fruits of autumn for their subsistence during the winter.” The scholiast on Pindar describes the situation of the inhabitants of Peloponnesus in the following manner ‖. “Now some have affirmed that the nymphs, who officiated in performing the sacred rites, were called *Melissa*. Of these Mnaseas of Patara gives the following account. They prevailed upon men to relinquish the abominable practice of eating raw flesh torn from living animals, and persuaded them to use the fruits of trees for food.— ¹²⁷ *Melissa*, one of them, having discovered bee-hives, ate of the honey-combs, mingled the honey with water for drink, and taught the other nymphs to use the same beverage. She called bees *Μελισσαι* *Melissæ*, from her own name, and bestowed much care on the management of them.

“These things (says he) happened in Peloponnesus; nor is the temple of Ceres honoured without

nymphs, because they first pointed out the mode of living on the fruits of the earth, and put an end to the barbarous practice of feeding on human flesh. The same ladies, too, from a sense of decency, invented garments made of the bark of trees.”

Hecataeus the Milesian, treating of the Peloponnesians, affirms *, “that before the arrival of the Hellenes, a race of barbarians inhabited that region; and that almost all Greece was, in ancient times, inhabited by barbarians †. In the earliest times (says † *Id. lib. 1.* Pausanias) (o) barbarians inhabited most part of the country called *Hellas*.” The original Greeks, if we may believe an author of deep research and superior ingenuity ‡, were strangers to all the most useful inventions of life. Even the use of fire was unknown till it was found out and communicated by Prometheus, who is thought to have been one of the first civilizers of mankind. Hence Æschylus ‖, introduces Prometheus commemorating the benefits which he had conferred upon mankind by his inventions, in a strain that indicates the uncultivated state of the world prior to the age in which he flourished. For the entertainment of our readers, we shall translate as much of that passage as suits our present purpose.

——— “Of the human race

Now hear the tale, how foolish erst they were :
I taught them thought and exercise of reason ;
If aught they saw before, they saw in vain.
Hearing, they heard not ; all was shapeless dreams
For a long space of time, at random mixt
In wild confusion : for they neither knew
Tile-cover'd houses standing in the sun,
Nor timber work ; but, like the earth-bred ant,
They lodg'd in sunless caves dug under ground :
No certain sign had they of winter cold,
Nor of the flow'ry spring, or summer store,
But blindly manag'd all ; till I them taught
What time the stars appear, what time they set,
Hard to be scan'd : then arithmetic rare,
That queen of arts, by dint of patient thought
Descry'd, I taught them ; and how vocal sounds
From letters join'd arose.”

This character, though applied to mankind in general, was in reality that of the most ancient Greeks. These forbidding features had been transmitted to the poet by tradition as those of his ancestors : he was a Greek, and of consequence imputes them to all mankind without distinction.

Phoroneus, the son and successor of Inachus §, is said to have civilized the Argives, and to have taught them the use of some new inventions. This circumstance raised his character so high among the savage aborigines of the country, that succeeding ages ¶ deemed him the first of men. Pelasgus obtained the like character, because he taught the Arcadians to live upon the fruit of the *fagus*, to build sheds to shelter them from the cold, and to make garments of the skins of swine.

But what clearly demonstrates the unpolished character of the most ancient Greeks is, the extravagant

(o) The Greeks borrowed this contemptuous epithet from the Egyptians. See Herod. l. ii. cap. 158.

gant honours lavished by them upon the inventors of useful and ingenious arts. Most of these were advanced to divine honours, and became the objects of religious worship to succeeding generations. The family of the Titans afford a most striking instance of this species of adulation. Jupiter, Juno, Mars, Apollo, Venus, Diana, &c. were sprung of this family. By the useful inventions which these personages communicated to the uncultivated nations of Greece, they obtained such lasting and such extravagant honours, that they jostled out the sidereal divinities of the country, and possessed their high rank as long as Paganism prevailed in those regions. To these testimonies of the savagism of the original Greeks, others almost without number might be added; but those adduced in the preceding part of this inquiry will, we hope, satisfy every candid reader as to the truth of the position advanced.

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A new colony arrives in Greece called *Pelasgi*.

While matters were in this situation with respect to the primitive Jonim or Greeks, a new colony arrived in those parts, which in a few years considerably changed the face of affairs. The people who composed this colony were called *Pelasgi*; concerning whose origin, country, character, and adventures, much has been written, and many different opinions exhibited by the learned. It is not our province to enter into a detail of their arguments and systems; we shall only inform our readers, that the general opinion is, that they were natives either of Egypt or Phœnicia. We have seen a dissertation in manuscript upon this subject, from which we are allowed to extract the following particulars.

The author, we think, has proved by very plausible arguments, that these people could not be descendants of the Egyptians nor Phœnicians. He maintains, that the *Pelasgi* were a great and numerous tribe; that they overspread all the coast of Asia Minor from Mount Mycale to Troas; that they were masters at one time of all the Asiatic and Grecian islands; that they over-ran Greece and many of the neighbouring countries; and all this in less than half a century. — These facts he seems to have proved from Homer, Herodotus, Diodorus Siculus, Pausanias, and other Greek authors of approved authenticity. He shows, that they were a civilized generation; that they were well acquainted with military affairs, legislation, agriculture, navigation, architecture, letters, &c. He insists, that Phœnicia could not at any given period have furnished such a numerous body of emigrants, even supposing the whole nation had emigrated, and left their native country a desert. He believes that this event took place before the invasion of Canaan by the Israelites; that consequently the *Pelasgi* migration was not occasioned by that catastrophe. He has shown, we think by very probable arguments, that the Egyptians in the earliest ages were averse to foreign expeditions, especially by sea; because that people hated this element, and besides could be under no temptation to emigrate: add to this, they were accustomed to live on small matters, and their country was exceedingly fertile and easily cultivated. It appears (says he) from Herodotus, that the *Pelasgi* were not acquainted with the religion of the Zabians, which could not have been the case had they emigrated from either of these countries. He makes it appear, at

least to our satisfaction, that Herodotus is mistaken when he supposes that the deities of Greece were derived from Egypt. He demonstrates, that the names of the greatest part of those deities are of Phœnician extraction; and this opinion he establishes by a very plausible etymological deduction. He asserts, that had the *Pelasgi* been natives of either of the countries above-mentioned, it would be absurd to suppose them ignorant of the names and religious rites of their respective nations. He finds, that the Egyptian and Phœnician colonies, which afterwards settled in Greece, were enemies to the *Pelasgi*, and either subdued or expelled them the country, which, he imagines, could scarce have been the case had both parties sprung from the same ancestors. After settling these points, he concludes, that the people in question were the progeny of the Arabian shepherds, who, at a very early period, invaded and subdued both the Lower and Upper Egypt. After possessing that country about a century and a half, they were conquered by Amenophis king of the Upper Egypt, who drove them out of the country. Upon this the fugitives retired to Palestine, where Mancho the Egyptian historian loses sight of them, and either through malice or ignorance confounds them with the Israelites. This writer supposes that those fugitives gradually directed their course for the west and north-west coasts of Asia Minor, whence they conveyed themselves over to Greece.

Such are the arguments by which the author of the dissertation above-mentioned supports his hypothesis. It is, for aught we know, altogether new, and to us it appears by no means improbable. If our curious readers should wish to know more of this subject, they may consult Gebelin's preliminary Discourse to his Greek Dictionary, Lord Monboddo's Inquiry into the Origin and Progress of Language, vol. i. towards the end, and Mr Bryant's Analysis of Ancient Mythology, *pass.*

Be this as it may, nothing is more certain than that the *Pelasgi* were the first people who in some degree civilized the savages of ancient Greece. It is not our business at present to enumerate the many useful inventions which they communicated to the Greeks, at that time worse than barbarians. We deem it, however, absolutely necessary as an introduction to our subject, to hazard a few conjectures on the language and letters of those adventurers; a point strictly connected with the subject soon to fall under consideration.

Whether we suppose the *Pelasgi* to have been the offspring of the Phœnicians, Egyptians, or Arabian shepherds, it will make little difference as to their language; every man of learning and research is convinced that those three nations, especially at that early period, spoke a dialect of the Hebrew. The *Pelasgi*, then, must have spoken a dialect of that language when they arrived in Greece. Perhaps it might have undergone several changes, and acquired some new modifications, during so many years as had passed since they began to be a separate nation, and in the course of so many peregrinations. Some monuments of theirs still extant prove this fact beyond all contradiction. As these people incorporated with the aborigines of Greece, the remains of the original language of mankind,

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Language.

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Who introduce letters into that country.

^{Greek Language.} kind, or at least so much of it as had been retained by them, gradually coalesced with that of the new settlers. From this, we think, it is obvious, that prior to the arrival of the new colonists from the East, the language now current among the two united tribes must have been a dialect of the Phœnician, Arabian, Hebrew, &c. Be that as it may, Herodotus || affirms that the Pelasgi in his time spoke a barbarous language, quite unintelligible to the modern Greeks.

|| Lib. i.
cap. 59.

The reason of this difference between the language of the Hellenes or Greeks in the age of Herodotus and that of the remains of the Pelasgi at that period, seems to be this: Prior to the time of that historian, the Greek language had, from time to time, undergone many changes, and received vast improvements; whereas, on the contrary, that of the remnant of the Pelasgi, who were now reduced to a very low state, had remained stationary, and was then just in the same predicament in which it had been perhaps a century after their arrival in the country.

As the Pelasgi, as was observed above, were a people highly civilized and well instructed in the various arts at that time known in the eastern world, they were skilled in agriculture, architecture, music, &c. (p): The presumption then is that they could not be unacquainted with alphabetical writing. This most useful art was well known in the countries from which they emigrated; and of course it is impossible to imagine that they did not export this art as well as the others above-mentioned. Diodorus Siculus imagines that § the Pelasgi knew not the use of alphabetical letters, but that they received them from Cadmus and his Phœnician followers; that those letters were afterwards called *Pelasgic*, because the Pelasgi were the first people of Greece who adopted them. This account must go to the score of national vanity, since very soon after he acknowledges * that Linus wrote the exploits of the first Bacchus and several other romantic fables in Pelasgic characters; and that Orpheus, and Pronapides the master of Homer, employed the same kind of letters. Zenobius likewise in-

§ Lib. 3.

* Ibid.

† Apud Dr
Gregory
Sharp's
Strict Greek
Language.

† See Plate
X.

|| Lib. i.
cap. 49.

* Lib. i.
c. 38.

forms us † that Cadmus slew Linus for teaching characters differing from his. These letters could be none other than the Pelasgic ‡. Pausanias, in his Attics, relates ||, that he himself saw an inscription upon the tomb of Coræbus, who lived at the time when Crotopus, who was contemporary with Deucalion, was king of the Argives. This inscription then was prior to the arrival of Cadmus; and consequently letters were known in Greece before they were introduced by this chief. It likewise appears from Herodotus himself, that the Ionians were in possession of alphabetical characters before the coming of the Phœnicians. "For (says he) * the Ionians having received letters from the Phœnicians, changing the figure and sound of some

of them, ranged them with their own, and in this manner continued to use them afterwards." If, then, the Ionians (q) ranged the Phœnician characters with their own, it is obvious that they had alphabetical characters of their own.

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Besides these historical proofs of the existence of Pelasgic characters, monuments bearing inscriptions in the same letters have been discovered in several parts of Greece and Italy, which place this point beyond the reach of controversy. What characters these were may be easily determined. As the Pelasgi emigrated from Arabia, the presumption is that their letters were Phœnician. They are said by Dr Swinton to have been 13 in number, whereas the Phœnician alphabet consists of 16. The three additional letters were probably invented by the latter people after the Pelasgi had left the eastern quarters. The Phœnician letters imported by the Pelasgi were, no doubt, of a coarse and clumsy contexture, unfavourable to expedition in writing, and unpleasant to the sight. Besides, the Phœnician characters had not as yet received their names; and accordingly the Romans, who derived their letters from the Arcadian Pelasgi, † had no names for theirs. The probability is, that † Lib. i. c. 75. prior to this era the Pelasgic letters had not been distinguished by names. They were of course no other than the original letters of the Phœnicians in their first uncouth and irregular form: and for this reason they easily gave way to the Cadmean, which were more beautiful, more regular, and better adapted to expedition. Plate IX.

Hitherto we have seen the Pelasgi and the Ionim incorporated, living under the same laws, speaking the same language, and using the same letters. But another nation, and one too of vast extent and populousness, had at an early period taken possession of a considerable part of the country afterwards distinguished by the name of *Hellas* or *Greece*. The Thracians were a great and mighty nation; inferior to none except the Indians *, says the father of Grecian history. These people, at a very early period, had extended their quarters over all the northern parts of that country. They were, in ancient times, a learned and polished nation. From them, in succeeding ages, the Greeks learned many useful and ornamental sciences. Orpheus (r) the musician, the legislator, the poet, the philosopher, and the divine, is known to have been of Thracian extraction. Thamyris and Linus were his disciples, and highly respected among the Greeks for their learning and ingenuity. That these people spoke the same language with the Greeks, is abundantly evident from the connection between them and these Thracian bards. The Thracian language, then, whatever it was, contributed in a great proportion towards forming that of the Greeks. From the remains of the Thracian dialect there appears to have been a very strong resemblance between it and the

* Herod.

lib. 5.

cap. 3.

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The Thra-

cians a

powerful

nation at

a very early

period.

(p) The Arcadians, who were a Pelasgic tribe, were highly celebrated for their skill in music. They introduced this art into Italy. See *Dion. Halicar. L. i.*

(q) The Athenians were originally called *Ionians*.

(r) Orpheus seems to be compounded of two oriental words, *or* "light," and *phi* "the mouth." Though some deduce it from the Arabian *arif* "a learned man."

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Language.

† Strabo,
lib. I & 7.

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The Greek
language
composed
of three dif-
ferent dia-
lects.

132
Arrival of
Cadmus in
Greece.

† Scaliger.

133
The letters
introduced
by him.

the Chaldean. This position we could readily support by the most plausible etymological deduction, did the limits prescribed us in this article admit such an inquiry. It appears, however, that the † Thracians, Getæ, and Daci or Davi, spoke nearly the same language. The Goths, so much celebrated in the annals of the lower empire, were the descendants of the Getæ and Daci, and consequently retained the dialect of their ancestors. The reader, therefore, must not be surprised, if in tracing the materials of which the Greek language is composed, we should sometimes have recourse to the remains of the Gothic.

We have now found out three branches of the Greek language; that of the Ionim or *Aborigines*, that of the Pelasgic tribe, and that of the Thracians. These three, we imagine, were only different dialects of the very same original tongue. This assertion we could readily prove by the comparison of a great number of words taken from the two last, were this a proper place for such a discussion.

Some centuries after the arrival of the Pelasgi, Cadmus, an Egyptian (s) by birth, and a sojourner in Phœnicia, arrived in Bœotia with a multitude of followers. This colony chief and his countrymen introduced letters and several other useful improvements into the country in question. As these people were natives of Phœnicia and its environs, their alphabet was that of their native country, consisting of 16 letters. That the Phœnician alphabet was nearly the same with the Samaritan and Hebrew, has been so often and so clearly demonstrated by the learned of this and the former century, that it would be altogether superfluous to insist upon it in this short inquiry. The Phœnicians, as is generally known, wrote from right to left, and the old Grecian characters inverted, exactly resemble the other.

The names of the Cadmean characters are Syrian †, which shows the near resemblance between that language and the Phœnician. They stand thus: *alpha, beth, gamma, delta* &c. The Syrians used to add *a* to the Hebrew vocables; hence alph becomes alpha, beth, betha or beta, &c. In the Cadmean alphabet we find the vowel letters, which is an infallible proof that this was the practice of the Phœnicians in the age of Cadmus; and this very circumstance furnishes a presumption that the Jews did the same at the same period.

After all, it is evident that the oldest Greek letters, which are written from right to left, differ very little from those of the Pelasgi. The four double letters *ε, φ, ξ, χ*, are said to have been added by Palamedes about 20 years before the war of Troy. Simonides is generally supposed to have added the letters *ζ, η, ψ*, though it appears by some ancient inscriptions that some of these letters were used before the days of Palamedes and Simonides.

In the year of our Lord 1456 seven brazen tables were discovered at Engubium, a city of Umbria in the Apennines, of which five were written in Pelasgic or Etruscan characters and two in Latin. The first of these tables is thought to have been composed

about 168 years after the taking of Troy, or 1206 years before Christ. By comparing the inscription on these tables with the old Ionic characters, the curious have been enabled to discover the resemblance.

The old Ionic character wrote from right to left continued in general use for several centuries: It was composed of the Cadmean and Pelasgic characters, with some variations of form, position, and sound. The Athenians continued to use this character till the year of Rome 350. The old Ionic was gradually improved into the new, and this quickly became the reigning mode. After the old Ionic was laid aside the * (*Βουστροφάδον*) Boustrophodon came into custom, which goes backwards and forwards as the ox does with the plough. They carried the line forward from the left, and then back to the right. The words were all placed close together, and few small letters were used before the fourth century. If our curious readers would wish to know more of letters and alphabets, we must remit them to Chishul, Morton, Postellus, the great Montfaucon, Gebelin, Astle, &c. For our part we are chiefly concerned at present with the Phœnician and Cadmean systems; and on these perhaps we may have dwelt too long. Having now, we hope, sufficiently proved that the Greek alphabet was derived from the Phœnician, in order to convince our curious but illiterate readers of the certainty of our position, as it were by ocular demonstration, we shall annex a scheme of both alphabets, to which we shall subjoin some strictures upon such letters of the Greek alphabet as admit any ambiguity in their nature and application.

A, *alpha*, had two sounds, the one broad like *a* in the English word *all*; the other slender, as *e* in *end*, *spend*, *defend*. The Hebrews certainly used it so, because they had no other letter to express that sound; the Arabs actually call the first letter of their alphabet *elif*; and they as well as the Phœnicians employ that letter to express both the sound of A and E promiscuously. The Greeks call their letter E *ε-ψιλον*, that is, E slender, which seems to have been introduced to supply the place of A slender.

H, *eta*, was originally the mark of the *spiritus asper*, and no doubt answered to the Hebrew *ח*. It is still retained in that capacity in the word *Ηικατον*, and in words with the *spiritus asper* beginning books, chapters, sections, &c. E originally marked both the sound of *Ελιον* and *Ητα*; that is, it was sometimes sounded short as at present, and sometimes long, where it is now supplied by H. As it was found convenient to distinguish these two different quantities of sound by different letters, they adopted H, the former *spiritus asper*, to denote the long sound of E, and substituted the present *spiritus asper* ['] in its place.

I, *iota*, is the Hebrew or Phœnician *jod* or *yod*. We imagine it originally served the purpose of both *iota* and *ypsilon*. It had two different sounds; the one broad and full, the other weak and slender. The latter had the sound of the modern *υψιλον*. That this was actually the case, appears in several monumental inscriptions: And upon this depends the variation of some cases

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Language.

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The old
Ionic cha-
racter.

* Pausan.
lib 5.
cap. 17.

135
The Greek
alphabet
derived
from the
Phœnician.

Greek Language cases of the demonstrative pronoun and of the second declension.

ο, *omicron* or small *o*, in the original Greek had three different sounds. It sounded *o* short, as at present; and likewise *o* long, now denoted by Ω or large *O*. It likewise marked the sound of the improper diphthong *ov*, sounded like the English diphthong *oo*. The Ω was taken from the Phœnician wau or *V*.

ι, *ypsilon*, we have observed before, was adopted to supply a mark for the sound of *I* slender.

ζ, *zeta*, is compounded of δς. Dion. Halic. however, informs us that this letter should be pronounced δς, according to the Doric plan.

θ, *theta*, was not known in the old Greek. It is compounded of τ and the *spiritus asper*, both which were of old written separately thus TH.

Ξ, *xi*, is compounded of ρς, κς, χς. These letters, too, were originally written separately.

Φ, *phi*. This letter is compounded of β, π, and the *spiritus asper*; thus BH, PH.

Χ, *chi*, like the foregoing, is compounded of γ, κ, and the *spiritus asper* as above.

Ψ, *psi*, like some of the rest, is made up of βς, πς, which, too, were originally written in separate characters.

These observations are thrown together purely for the use of students who may not choose to penetrate into the *minutiæ*. We are sorry that the nature of the work will not permit us to extend our researches to greater length. The reader will find an ancient inscription on Plate CCCXC, in which the powers of the letters are exemplified as they were in the first stage of the Greek language. Every language, we believe, was originally composed of inflexible words; the variations which now distinguish nouns and verbs were the effects of progressive improvements. What might have been the state of the Greek language with respect to these variations in its original form, it is not now possible to discover. That it was rude and irregular, will not, we imagine, be controverted. One of the first attempts towards forming the variations, now denominated *declensions* and *conjugations*, would probably be made upon the *demonstrative* article and the *substantive* verb. This observation will be found to hold good in most polished languages. In the Greek tongue, this was evidently the method.

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Origin and
flexion of
the article.

The original Greek article was imported from the east. It was the Hebrew or Phœnician *ba*. This particle sometimes signifies *one*, and sometimes it answers to our demonstrative *the*; both in its adverbial and demonstrative capacity it imports demonstration. In the earliest stages of the two oriental languages, it was probably written apart, as *ba-melech* "the king." In process of time it came to be joined with the following word, as *Hammelech*. From this we think the Greek article was deduced. It is still retained in the Doric dialect in its pristine character. The difference between *ho* and *ha* in the eastern language is nothing. Here then we have the articles *ο* masculine and *α* feminine. Upon these several changes were superinduced, in order to render them more useful for the purposes of language. For these changes we know of no archetype.

The Greeks then having adopted the Hebrew, or Phœnician, or Chaldean article *ba*, and changed it in-

to *ho* for the masculine, seem to have arranged its variations in the following manner:

Greek Language.

Sing.	Plu.
Nom. <i>ο</i>	<i>οι</i>
Gen. <i>ου</i>	<i>ων</i>
Dat. <i>οι</i>	<i>οις</i>
Acc. <i>ον</i>	<i>ους</i>

In the earliest stages of the Greek language, *ι* and *υ* were sounded in the same manner, or nearly so, as was observed above. The accusative was at first like the nominative; for distinction's sake it was made to terminate in *υ*, which letter was likewise adopted to characterize the genitive plural; *ς* was annexed to the dative plural, to distinguish it from the dative singular. The radical word was still without inflexion.

When the article was inflected in this manner, the process stood as follows: we take *λογος* for an example.

Sing.	Plu.
Nom. <i>ο λογος</i> speech	<i>οι λογος</i> speeches
Gen. <i>ου λογος</i> of speech	<i>ων λογος</i> of speeches
Dat. <i>οι λογος</i> to speech	<i>οις λογος</i> to speeches
Acc. <i>ον λογος</i> speech	<i>ους λογος</i> speeches

In this arrangement our readers will observe, that in the time under consideration, *ω* was not yet introduced; and therefore *ομακρον* or little *ο* was the same letter in the genitive plural as in the accusative singular; but in the latter case it was sounded long by way of distinction.

The article *ha*, which is still retained in the Doric dialect, was varied as follows:

Sing.	Plu.
Nom. <i>α</i>	<i>αι</i>
Gen. <i>ας</i>	<i>ων</i>
Dat. <i>αι</i>	<i>αις</i>
Acc. <i>αν</i>	<i>ας</i>

These variations differ a little from those of the masculine; and they were no doubt made for the sake of distinction, as is usual in such cases. We shall now give an example of the feminine as it must have stood before variations were introduced. We shall employ *τιμη*.

Sing.	Plu.
Nom. <i>α τιμη</i> honour	<i>αι τιμη</i> honours
Gen. <i>ας τιμη</i> of honour	<i>ων τιμη</i> of honours
Dat. <i>αι τιμη</i> to honour	<i>αις τιμη</i> to honours
Acc. <i>αν τιμη</i> honour	<i>ας τιμη</i> honours

Afterwards, when the Chaldean article *da* was adopted for the neuter gender, the letter *τ* or *d* was changed into *ν*, and prefixed to it; and then the Greeks, who, in their declension of adjectives, always followed the neuter gender, began to prefix it to the oblique cases.

In this manner we think the Greek nouns stood originally; the only change being made upon the article. At length, instead of prefixing that word, and expressing it by itself, they found it convenient to affix a fragment of it to the noun, and so to pronounce both with more expedition. Thus *ος-λογ*, *e. g.* became *λογ-ος*, *ου λογ* became *λογ-ον*, and of course *λογος* and *λογου*, &c. The *spiritus asper*, or rough breathing, was thrown away, in order to facilitate the coalition. Nouns of the neuter gender, as was necessary, were distinguished by using *ν* instead of *ς*. In Oriental words the Greeks often change *ς* into *ν*, and *vice versa*.

In this case the Greeks seem to have copied from

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Language.

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In this
mode of
flexion the
Greeks copied from
the Orientals.

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Formation
of the third
declension,
and of its
cases.

an eastern archetype. In Hebrew we find an arrangement exactly similar. To supply the place of the pronouns possessive, they affix fragments of the personals: Thus, they write *ben-i* "my son," instead of *ben-ani*, and *debir-nu* "our words," instead of *debir-anu*, &c. The persons of their verbs are formed in the same manner. In this way, in our opinion, the variations of the first and second declensions were produced.

After that a considerable number of their nouns were arranged under these two classes, there remained an almost infinite number of others which could not conveniently be brought into these arrangements; because their terminations did not readily coalesce with the articles above-mentioned. These, like nouns of the neuter gender, were in a manner secluded from the society of the two other classifications. It is probable that these for a long time continued indeclinable. At last, however, an effort was made to reduce them into a class as well as the others. All these excluded nouns originally terminated with *s*, which appears from their genitives as they stand at present. By observing this case, we are readily conducted to the termination of the pristine vocable. The genitive always ends in *os*, which ending is formed by inserting *o* between the radical word and *s*. By throwing out *o* we have the ancient nominative: Thus, *Τίταν*, genitive *Τιτανος*; taking out *o* we have *Τίτανς*, the original inflexible termination. *Ἀντα*, genitive *Ἀντοος*; throw out *o* and you have *Ἀντος*. *Παλλας*, genitive *Παλλαδος*; take away *o* and there remains *παλλαδς*. *Ορνις*, genitive *Ορνιδος*; by throwing out *o* we have *Ορνιδς*. *Ἀναξ*, genitive *Ἀνακτος*, *Ἀνακτς*. *Κρατος*, genitive *Κρατοςς*, *Κρατςς*; originally *Κρατς*, because originally it had the sound of *n*, as was observed above. *Μελις*, genitive *Μελιτοςς*, *Μελιτςς*. *Ειδος*, genitive *Ειδοςς*, *Ειδιςς*, the old noun. In short, the genitive is always formed by inserting *o* immediately before *s*, which is always the termination of the nominative; and by this rule we easily discover the noun such as it was in its original form.

The dative of this declension was closed with *ascriptum*; the same with that of the second, namely, *subscriptum*. The accusative commonly terminates with *a*; but was originally ended with *v*. The Romans imitated the Æolian dialect, and they commonly ended it with *em* or *im*. The Greeks, perhaps, in this imitated their progenitors, for *a* was their favourite vowel. The nominative plural ended in *es*, which nearly resembles the English plural, and was possibly borrowed from the Thracians. The genitive plural in all the declensions ends in *on*; the dative ends in *on*, the *o* being inserted to distinguish it from the dative singular. When a strong consonant, which would not easily coalesce with *s*, comes immediately before it, that consonant is thrown out to avoid a harsh or difficult sound. The sum then is; the cases of nouns of the first and second declensions consist of the radical word with fragments of the articles annexed, and these were the first classifications of nouns. The other nouns were left out for some time, and might be denominated *neuters*; at length they too were classified, and their variations formed as above. In this process the Greeks deviated from the oriental plan; for these people always declined their nouns by particles prefixed. Whether the Greeks

were gainers by this new process, we will not pretend positively to determine. We are, however, inclined to imagine that they lost as much in perspicuity as they gained by variety.

It is generally believed that the Greeks have no ablative; to this opinion, however, we cannot assent. It is true, that the dative, and what we would call the *ablative*, are always the same: yet we think there is no more reason to believe that the latter is wanting in Greek, than that the ablative plural is wanting in Latin, because in that language both these cases are always alike.

In the eastern languages there are only two genders, analogous to the established order of nature, where all animals are either male or female. But as the people of the East are, to this day, strongly addicted to personification, they ranged all objects of which they had occasion to speak, whether animate or inanimate, under one or other of these two classes. Hence arose what is now called the *masculine* and *feminine* genders. The orientals knew nothing of a neuter gender, because, indeed, all objects were comprehended under the foregoing classes. The Phœnician feminine was formed from the masculine, by adding *ah*. In this the Greeks in many cases imitated them. The Greeks and Latins left a vast number of substantives, like a kind of outcasts, without reducing them to any gender; this process gave rise to the neuter gender, which imports, that such substantives were of *neither* gender. This has the appearance of a defect, or rather a blemish, in both. Sometimes, too, they make words neuter, which, according to the analogy of grammar, ought to be either masculine or feminine. And again, they range words under the masculine or feminine, which by the same rule ought to have been neuter. In short, the doctrine of generical distribution seems to have been very little regarded by the fabricators of both tongues. The beauty which arises from variety seems to have been their only object.

The use of the article in the Greek language is, we think, rather indeterminate; it is often prefixed to proper names, where there is no need of demonstration nor generical distinction. On the contrary, it is often omitted in cases where both the one and the other seem to require its assistance. In short, in some cases it seems to be a mere expletive. Though both Lord Monboddo and Mr Harris have treated of this part of speech, neither the one nor the other has ascertained its proper use. (See *Orig. and Progr. of Language*, vol. ii. p. 53. *Hermes*, page 214. *et seq.*).—We know not any objection to the early use of articles among the Greeks so plausible as the total neglect of them among the Romans. But it ought to be considered, that after the flexions were introduced, the use of the article was in a great measure neglected. Accordingly, Lord Monboddo observes that it is very seldom used as such by Homer, but commonly in place of the relative pronoun, *ὅς*, *ὃς*, *ὅ*.—Thus it would appear, that at the time when the Roman language was reduced to the Grecian standard, the article was not commonly used by the Greeks; and of course the Latins never employed it. There can be no doubt but the pronoun *who*, in the northern languages, is the same with the Greek *ὅς*, and the Hebrew *hua*. This among the northern people is always

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Language.

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Greek ab-
lative.

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Genders.

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Further ob-
servations
on the ar-
ticle.

ways

Greek
Language.

ways a relative, which affords a presumption that the Greeks originally used the article in the same manner as we do at present. The fact is, that the articles having once got into vogue, were often positively used as mere expletives to fill up a gap; and that, on the other hand, when there was no occasion for pointing out an object, it being fully determined by the tenor of the discourse, it was often omitted.

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Adjectives.

In forming adjectives, they followed the same plan that they had done with substantives. Their great effort was to make their adjectives agree with their substantives in gender, number, and case. This arrangement improved the harmony of speech; and nothing could be more natural than to make the word expressing the quality correspond with the subject to which it belonged.

As adjectives denote qualities, and thus are susceptible of degrees, nature taught them to invent marks for expressing the difference of these degrees. The qualities may exceed or fall below each other by almost numberless proportions; it was, however, found convenient to restrict these increases and decreases to two denominations. The positive is, properly speaking, no degree of comparison at all; therefore we need only point out the formation of the comparative and superlative.

The former is generally thought to be fabricated, by first adding the Hebrew word רַב , *excellent*, to the positive, and then affixing the Greek termination ος ; and the latter, by affixing the Syrian word *tath* and the syllable ος , in the same manner.

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Greek numerals.

Every nation, even the most uncivilized, have early acquired the notion of number. Numerical characters and names are the same in many different languages. These terms were discovered, and in use, long before grammar came to any perfection; and therefore remain either inflexible or irregular. The first way of computing among the Greeks was by the letters of the alphabet; so that A signified *one* and Ω *twenty-four*: in this manner the rhapsodies of Homer are numbered; and so are the divisions of some of the Psalms, as is generally known. But a more artificial plan of computation was obviously necessary. They divided the letters of the alphabet into *decades* or tens, from A to I = 10. To express the number 6, they inserted ζ *batw* = 6; so that by this means the first decade amounted to 10. In the next decade every letter increased by tens, and so P denoted 100. In this decade they inserted ζ *κοττα* = 90. In the third, every letter rose by 100; so that χ *σαντι* = 900. By inserting these three Phœnician characters they made their alphabet amount to 900. To express chiliads or thousands, they began with the letters of the alphabet as before; and to make the distinction, they placed a dot under each character, as the units, tens, hundreds, were distinguished by an acute accent over them.

But in monumental inscriptions, and in public instruments, a larger and more lasting numerical character was fabricated. They began with I, and repeated that letter till they arrived at Π = 5. This is the first letter of *πεντε* 5. Then they proceeded, by repeating I till they came to 10 Δ , the first letter of *δεκα*, 10. Then they repeated Δ over and over, so that four Δ = 40. To express 50, they used this me-

thod; they inclosed Δ in the belly of $\overline{\Delta}$ = 50, $\overline{\Pi}$ = 500 $\overline{\Pi}$ = 50,000, &c. Often, however, X signifies 1000, and then we have $\delta\iota\varsigma$ *χιλίοι*, 2000, *τρεῖς*, *χιλίοι* 3000; and so of the rest.

Greek
Language.145
Pronouns.

The word *pronoun* signifies a word placed instead of a noun or name; and indeed the personal pronouns are really such: this needs no explication. The pronoun of the first person is one of those words which have continued invariable in all languages; and the other personals are of the same character. The relatives, possessives, demonstratives, and gentiles, are generally derived from these, as may be discerned by a very moderate adept in the language. Our readers will therefore, we hope, easily dispense with our dwelling upon this part of speech.

Verb. In most ancient languages, verbs, according to the order of nature, have only three tenses or times, namely, the *past*, *present*, and *future*. The intermediate tenses were the invention of more refined ages. — The Greek, in the most early periods, had no other tenses but those above-mentioned. The manner of forming these we shall endeavour to point out, without touching upon the nature of the rest, since an idea of them may be acquired from any common grammar.

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Greek
verbs, how
formed.

We have observed above, that the flexion of nouns of the first and second declensions are formed by annexing fragments of the articles to the radical words; and that the variation of the tenses were produced by joining the substantive-verb, according to the same analogy. Every Greek verb was originally an inflexible biliteral, triliteral, quadriliteral or dissyllabic radix. The variations were formed a long while after in the manner above intimated.

The Greeks had their substantive or auxiliary verb, from the Phœnician or Chaldean verb היה , *fuit*. This verb, taking away the gentle aspirate from both beginning and end, actually becomes *u*. This vocable the Greeks brought along with them from the East, and manufactured after their own manner, which appears to have been thus:

Pres.	$\epsilon\omega$, $\epsilon\epsilon\varsigma$, $\epsilon\epsilon$,	$\epsilon\omicron\mu\epsilon\nu$, $\epsilon\epsilon\tau\epsilon$, $\epsilon\omicron\sigma\iota$,
Cont.	ω , $\epsilon\iota\varsigma$, $\epsilon\iota$,	$\omicron\upsilon\mu\epsilon\nu$, $\epsilon\iota\tau\epsilon$, $\omicron\upsilon\sigma\iota$,
Fut.	$\epsilon\sigma\omega$, $\epsilon\sigma\epsilon\iota\varsigma$, $\epsilon\sigma\epsilon\iota$,	$\epsilon\sigma\omicron\mu\epsilon\nu$, &c.

We place $\omicron\sigma\iota$ in the third person plural, because for many centuries $\omicron\mu\iota\chi\rho\omicron\nu$ supplied the sound of the diphthong *ou*. By these variations it will appear that the radical verb was rendered capable of inflexion. We have observed that Greek verbs were a collection of biliteral, triliteral, or quadriliteral, radical words. — The following may serve for examples: $\tau\iota$, $\lambda\epsilon\gamma\epsilon\iota$, $\mu\alpha\epsilon\iota$, $\tau\upsilon\pi\epsilon\iota$, $\tau\alpha\nu$, $\epsilon\alpha\pi$, $\Delta\alpha\mu$, $\Delta\eta\lambda$, $\Delta\epsilon\iota\chi$.

These radicals are taken at random; and we believe our Grecian student, by adding the terminations, will readily find them all significant verbs. With these radicals, then, and the substantive-verb, we suppose the present and future tenses were formed.

But it is now generally admitted that the modern present was not the original one of the verb. The second, or Attic future, appears plainly to have been the most ancient present. When the language was improved, or rather in the course of being improved, a new present was invented, derived indeed from the former, but differing widely from it in its appearance and complexion. Upon this occasion, the old present

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Original
present that
which is
now the se-
cond fu-
ture.

Greek
Language.

was degraded, and instead of intimating what was *doing at present*, was made to import what was immediately to be done hereafter. By this means, *γραφω*, contracted into *γραφῶ*, *I am writing*, came to intimate *I am just going to write*. This change was probably made for the sake of enriching the language, for variety, for energy. Thus, *τυπω* contracted *τυπῶ* became *τυπτῶ*, *τικῶ*, *τικτῶ*, &c. According to this theory, we find, that such verbs as now have no second future retain their original form, only the circumflex has been removed in order to accommodate them to the general standard. Grammarians have now chosen the three characteristic letters of active verbs from the present, first future, and perfect. The true characteristic of the original verb was that of the present second future. Many verbs are now destitute of that tense, because, since the invention of the new present, those have fallen into disuse.

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Formation
of the modern
present,

Let us now take the verb *λεγω*, *dico*, in order to make a trial; and let us write the radix and the auxiliary, first separately, and then in conjunction: Thus,

λεγ-εω, *λεγ-εις*, *λεγ-ει*, *λεγ-ομεν*, *λεγ-ετε*, *λεγ-ουσιν*. Then we will have contracted *λεγῶ*, *λεγῆς*, *λεγει*, *λεγομεν*, *λεγετε*, *λεγουσι*. Here, we believe, every thing is self-evident.

The English would run thus: Saying *I am*, saying *thou art*, saying *he is*, &c. At first the radix and the auxiliary were pronounced separately, as we do our helping verbs in English, and would have been written in the same manner had words been then distinguished in writing.

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First future,
and

The present first future occupied the same place that it now does, and concurred in its turn to complete the future in conjunction with the radix. That the substantive verb was inflected in the manner above laid down, is obvious from its future middle *ισομαι*, and from the future of the Latin verb *sum*, which was of old *eso*, *esis*, &c. Verbs in *λω*, *μω*, *νω*, *ρω*, often take *σω* in the first future. See *Fœd. Græc. ap. Marm. Oxoni.* l. 67. Verbs in *λω* and *ρω* assume *σ* by analogy, as *κίλλω*, *κίλσω*, *Eurip. Hecub.* v. 1057. *κίλσαι Hom. Od.* x. v. 511. *τίλλω*, *τίλσω*, *unde τίλσων*, *Il. x. v. 707.* *ορῶ*, *ορῶμεν*, *Pind. Nem. Od. 9. Duodec. 2.* *τίρω*, *τίρσει*, *Theoc. Idyll. 22. v. 63.* In fine, the Æolic dialect after the liquids often inserts *σ*.

It must be observed, that the Greeks, in order to accelerate the pronunciation, always throw out the *ι* and *ο*, except in verbs ending in *αω*, *εω*, *οω*; where they generally change them into *η* and *ω*. When the last letter of the radix can coalesce with *σ* after *ι* is thrown out, they transform it, so as to answer that purpose; if not, they sometimes throw it out. We shall once more take *λεγω* for an example:

λεγ-εω, *λεγ-εις*, *λεγ-ει*, &c.

Throwing out *ι*, it would stand *λεγ-σω*, *λεγ-σεις*, &c. by changing *γς* into *ξ* it becomes *λεξω*. *Α θ* and *σ* cannot coalesce with *σ*, therefore they throw them out: thus, *Αδω*, future first *ασω*; *πληθω*, future first *πλησω*; *Ανυτω*, *Ανυσω*, &c.

These are the general rules with respect to the formation of the present and future of active verbs in the earliest stages of the Greek language. The limits prescribed will not allow us to pursue these con-

tures; but the reader may, if he thinks proper, carry them a great way.

The præterite tense falls next under consideration. If we may trust analogy, this, as well as the other two, must have owed its conformation to the radix of the verb, and some other word fitted to eke out its terminations. It has been thought by some critics, that this addition was taken from the Hebrew word *היה*; and we should be of the same opinion did not another auxiliary present itself nearer home, which appears to us much more congruous to such a purpose. Perhaps, indeed, the people from whom we suppose it borrowed, derived it from the eastern quarters. We have already observed, that the Thracians were masters of a great part of Greece in the very earliest ages. At that time they were a polite and learned people. From them a considerable part of the Greek language was derived. If, therefore, we should find a word in their language employed for the same purpose, and accommodated to coalesce with the radical verb, we feel ourselves very much inclined to prefer such a word.

The word *ha* pervades many different languages as an auxiliary verb. From it we have the Italian *ho*, the Spanish *he*, the French *ai*; and in one shape or other it appears in all the German and Scandinavian dialects. It is the Gothic auxiliary; and, we believe, it forms the termination of the perfect active of the first conjugation in the Latin tongue: For there *am* is the radix of *amo*; in the præterite *am-avi*, *amavi*; and the præterperfect *am-hav-eram*, i. e. *amaveram*, compounded of *am*, *hav*, and *eram*, the imperfect of the indicative of the substantive verb. This process, in the formation of the præterite of Latin verbs, will scarce be questioned, and forms certainly a presumptive proof that the Greeks pursued the same line. From this verb is likewise derived the Latin *habeo*, by changing *v* into *b*, which are indeed the same letter. Our readers, after this detail, will not be surprised if we should now hazard a conjecture, and declare it as our opinion, that this same Gothic auxiliary *ha* is actually the additional part of the præterite of Greek verbs, and that part upon which the conjugation depends.

In forming this combination between the radix and the auxiliary, the Greeks were obliged to fabricate several devices. As often as the last letter of the radix could not unite with the aspirate in *ha*, they metamorphosed it into one of the double letters, which are capable of coalescing with it. In the verb *λεγω*, *γ* was changed into *χ*; thus, *λεγ ha* became *λεχα*, *τυπω* præterite *τυπ ha*, was combined into *τυφα*. In verbs which had a radix that would not admit this conjunction, they hardened the *h* into *κ*, as in *τιω*, præterite *τι-κα*, *Ακου-κα*. Many other ways were contrived to facilitate this reunion. These are detailed in every Greek grammar, and so need not be mentioned.—What has been said with respect to this configuration, we offer as a pure conjecture, without the most remote intention of obtruding it upon our readers.

If it is admitted, that the auxiliary *ha* formed the conjugating termination of the active verb among the Greeks, it will likewise be admitted, that the radical verb and the other made originally two distinct words: that, according to this scheme, the præterite would

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Language.

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Præterite
tenses.

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Origin of
the auxili-
ary verb.

*Exemplum Ionicarum Priscarum
Literarum ex columna, quæ in via Appia reperta, postea ad hortos
Farnesianos traducta est.*

ODEMI. ΘΕ MITON. METAKINE S. ALEK. TO. TPIOPIO. HO
ESTIV. EPI. TO. TRITO. EN. TEL. HODOI. TEL. ΑΠΛΑΙ. EN TOI
HERODO. ΑΒΟΙ. ΟΛΑΡ. LOION. TOI. KINESANTI. MARTVS
DALMON. ENHODIA. KAI. HOI. KIONES. DEMETROS
KAI. KORES. ΑΝΑΘΕΜΑ. ΚΑΙ ΘΟΜΙΟΝ. ΘΕΟΝ. ΚΑΙ.

Sancrit Alphabet.

Vowels.

अ आ इ ई उ ऊ ऋ ॠ लृ ॡ ए ऐ ओ औ अं अः
ā or ē ā ē ō ō rū rū lū lū ē ē ō ō au au urī ah, or, ch

Connected Vowels.

क का कि की कु कू कृ कु के कै को कौ कं कः

Consonants.

क ख ग घ ङ च छ ज झ ञ ट ठ ड ढ ण न य द
kē khē gu ghu ŋ or ŋē chī chha ja jha ŋya tā thā dē dhē na tē t, hē dē

ध न प फ ब भ म य र ल व श ष स ह क्ष ण
d, hē ne pa p, ha bē bhe mē yē rā lē vē śā śha i, z, h kha x jīya or gya

Greek Language. proceed thus, *λεγειν* *ha*, said *I have*; *λεγεις* *bas*, said *thou hast*; *λεγει* *he*, said *he hath*, &c. This process to us appears rational, elegant, and advantageous. The pluperfect was not then invented, and therefore it does not come under our consideration. The other tenses were all deduced from those described; and in forming these intermediate distinctive tenses, we believe that both critics and grammarians, and perhaps philosophers too, were employed. See GRAMMAR.

The eastern nations have diversified their verbs, by affixing fragments of the personal pronouns to the radix, by which they gained only the advantage of exhibiting the genders of the persons engaged in being, acting, and suffering; but a perpetual repetition of these was unavoidable. The Greeks, by their artificial combination of the radix with the two auxiliaries, avoided the necessity of repeating their personal pronouns, as we and the other modern inhabitants of Europe are obliged to do; and at the same time, by diversifying the terminations of their nouns and verbs, wonderfully improved the beauty and harmony of their language. The arrangement above insisted on is so very different from that of the orientals, and so entirely Gothic, that we think there can be no doubt that the Greeks borrowed this manœuvre from the Thracians. Every person moderately acquainted with the Greek language will, upon examination, discover a wonderful coincidence between the structure, idioms, and phraseology, of the English and Greek languages: so many congenial features must engender a strong suspicion that there once subsisted a pretty intimate relation between them.

In the preceding deduction, we find ourselves obliged once more to differ from the very learned author of the *Origin and Progress of Language*. As we took the liberty to question his originality of the Greek language, and at the same time presumed to attack the goodly structure raised by philosophers, critics, and grammarians; so we now totally differ from that learned writer as to his theory of the creation of verbs out of the inhale matter of *αω*, *ω*, &c. This whole fabric, in our opinion, leans on a feeble foundation.

The apparatus of intermediate tenses, of augments, derivation of tenses, with their formation, participles, and idiomatical constructions, and other essentials or appendages, we omit, as not coming within the verge of the disquisition.

152 Derivation and formation of the middle voice, The derivation and formation of the middle and passive voices, would certainly afford matter of curious speculation; but the labour necessary to investigate this connection would greatly overbalance the benefit expected.

However, to complete our plan, we shall subjoin a few strictures with respect to the formation of the middle-voice, which was, in our opinion, immediately formed from the active.

We have seen already, that the active voice in its original state was formed by annexing fragments of the substantive or auxiliary verb to the radix. The same economy was observed in fabricating the flexible parts of the verb of the middle voice. To demon-

strate this, we shall first conjugate the present tense of the auxiliary passive upon the principles above laid down.

Present, *Εομαι*, *εισαι*, *ειται*, *εομεθα*, *εσθε*, *εονται*. Such was the passive-present of the auxiliary. We shall now take our example from the verb *τυπτω*; second future *τυπ-εσμαι*, *struck I am*, *τυπ-εισαι*, *struck thou art*, *τυπ-ειται*, *struck he is*, &c. contracted *τυπουμαι*, *τυπη*, *τυπιται*. The conjunction and formation here is obvious. Perhaps, in the second person, *σ* was inserted, which, however, is thrown out in the process of the persons. The future middle is clearly formed, by affixing the future-passive of the verb *ειω*, only as *η* was introduced into the language for *ε* long, it was generally (*τ*) substituted instead of that vowel in verbs ending in *αω* and *ω*, and *ω* for *ο* in verbs ending in *οω*; the two vowels *ε* and *ο* being originally long as well as short, till *η* was adopted to denote the long sound of the former, and *ω* that of the latter. In many verbs, before the conjunction of the radix and auxiliary, *ε* was thrown out: thus, *τυπ-εσμαι* became *τυφουμαι*, *λεγ-ισομαι*, *λιζομαι*, &c.

The præterite was deduced from that of the active by a very slight variation, so trifling, indeed, that it need not be mentioned; only we may observe, that the aspirate *h* is never retained in this tense, which originally seems to have been the only distinguishing character by which that tense of the middle-voice differed from the same tense of the active.

From the strict analogy between the mode of forming the three primary tenses of the active and middle voice, we are led to suspect that what is now the middle was originally the passive voice.

The immediate formation of the former, by annexing the passive auxiliary, is obvious. The middle voice still partakes of the passive signification, since it has sometimes a passive, though more frequently an active. There are several parts of the present passive quite analogous to the same tenses in the middle: and, lastly, it is the common progress, in the course of improvement, to proceed step by step, and by approximation. What is most simple and easy is the first object, then succeeds what is only a little more difficult, and so on till we arrive at the last stage, when human ingenuity can go no farther. Now, it will readily be admitted, that the passive voice is much more embarrassed and intricate in its texture than the middle; and, therefore, the former should have been posterior in point of time to the latter.

We are well aware, that the very learned Kuster, and most other moderns, deeply skilled in the origin, progress, and structure, of the Greek language, have thought otherwise. The general opinion has been, that the Greek middle voice answered exactly to the Hebrew conjugation *hithpachal*, and in its pristine signification imported a reciprocity, or when the agent acts upon itself. For our part, we only intended a few hints upon the subject, which our learned readers may pursue, approve, or reject, at pleasure.

If we might pretend to investigate the formation of the passive voice, we should imagine that the modern

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(τ) We say generally, because in verbs ending in *ω*, the *ε* is sometimes retained, as *τελειω*, *τελειωω*, *αρχι-εω*.

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And of the
passive.

der present was formed from the ancient one, by inserting such letters as were found necessary for beauty, variety, energy, &c.; the first future from the second future middle of the verb *τιθημι*, once *θιω*. This future is *θησομαι*; and, joined to the radix, always occupies that place, *τι-θησομαι*, *τιλεθησομαι*, *φλεχθησομαι*, *τυρθησομαι*, and so of the rest: whether *μαι*, *σαι*, *ται*, which occur so frequently as the terminations of the middle and passive voices, are fragments of some obsolete verb, we will not pretend to determine.

From verbs in *αω*, *εω*, *οω*, *υω*, are formed verbs in *μι*; which in the present, imperfect, and second aorist, as it is called, only have a different form, by assuming *μι* with a long vowel preceding it, in the present active; which vowel is preserved in each person singular. This collection of irregular verbs seems to be formed from the verb *ειμι*, which in some dialects might be *ημι*. Indeed the imperfect *ην*, *ης*, *η*, seems to imply as much: in this, however, we dare not be positive.

In the whole of this analysis of the formation of verbs, we have laid down what to us appears most plausible. That metaphysical critics may discover inaccuracies in the preceding detail we make no doubt; but our candid readers will doubtless reflect, that no language was ever fabricated by philosophers, and that the elements of language were hammered out by peasants, perhaps by savages. Critics have created a philosophy of language we admit, and have a thousand times discovered wonderful acuteness and ingenuity in the mechanism of words and sentences, where the original onomathetæ never apprehended any, and which possibly never existed but in their own heated imagination. If our more enlightened readers should find any thing in the preceding detail worthy their attention, so much the better; if the contrary should happen, we presume they will take up with the hackneyed system. We have all along neglected the dual number, because it regularly follows the type of the other numbers.

Be that as it may, before we drop this subject we must take the liberty to subjoin an observation or two with respect to the consequences of the practice of new-modelling the present, and of course the imperfect, tenses of verbs. 1st, After this arrangement they commonly retained all the other tenses exactly as they had stood connected with the primitive verb: this needs no example. 2d, They often collected the tenses of verbs, whose present and imperfect were now obsolete, in order to supply this defect. Thus we have *φρω-οισω*, *ειρχα*, *ηνοχα*. 3d, They often formed present and imperfect tenses without any other tenses annexed: The poets in particular seem to have fabricated these two tenses at pleasure.

If this procedure was convenient for the poets, it was certainly most incommodious with respect to the vulgar, as well as to foreigners who had an inclination to learn the language. The vulgar, some ages after Homer and Hesiod, must have found it as difficult to understand their poems as our people do to comprehend those of Chaucer and Spenser. By this disposition, too, the etymology of verbs was almost entirely confounded. The present second future being, as has

been observed, the ancient present, the attention of the curious etymologist was naturally diverted to the modern present, where it was utterly impossible to discover the radical word. A few examples will elucidate this point: *τεινω*, to stretch, to extend, old present *τανω*; *ταν* is the radix, which at once appears to be a Persian word signifying a large tract of country. Hence *Mauritania* "the land of the Mauri," *Aquitania*, *Bretania*; and with a prefixed *Hindo*-stan, *Chusi*-stan, *Turque*-stan. The obsolete verb *οπω*, whence *οπωμαι*, is evidently derived from *οφ*, an Egyptian name of the moon: *φαινω*, second future *φανω*, to show, from the Egyptian word *phan* or *pan*, a name of the sun: *τυπτω*, future second *τυπα*; *τυπ* is obviously the offspring of *επ* *thaph*, "a drum or timbrél," from beating or striking, &c. In such etymological researches, the student must be careful to turn the Ionic *η* into the Doric *α*; because the Dorians were latest from the coast of Palestine, and consequently retained the largest share of the Phœnician dialect: thus *ἡθιω*, to rejoice, turning *η* into *α* becomes *γαθιω*. This word, throwing away the termination, becomes *γαθ*, plainly signifying a wine press (υ). It is likewise to be observed, that the Æolians often change *α* into *υ*, as *συρξ* instead of *σαρξ*, &c.

It is not our intention to enter into the arrangement and peculiar constructions of the Greek language. There is, however, one, which we cannot well pass over in silence. As that tongue is destitute of those words which the Latins call *gerunds*, to supply this defect they employ the infinitive with the article prefixed; thus, *Εἰς τὸ εἶναι αὐτοὺς φίλους*, in order to their being friends; *ἀπὸ τῆ ἰλίσθαι αὐτοὺς βασιλεῖα*, from their having elected a king; *ἐκ τῆ ἀποφεύγειν αὐτοὺς ἐκτὸς πόλεως*, from their flying out of the city. In these phrases the infinitive is said to assume the nature of a substantive noun; agreeing with the article before it, exactly as if it were a noun of the neuter gender. Idioms of this kind occur in our own tongue; only with us the verb, instead of being expressed in the infinitive, is turned into the participle. According to this arrangement, the first of the preceding phrases, which, according to the Greek, would stand *toward to be friends*, in English is, *in order to their being friends*. This anomaly, then, if indeed it be such, is of no manner of consequence. The French, if we are not mistaken, would express it in the very same manner with the Greek, that is, *pour être amis*.

From treating of verbs, we should naturally proceed to the consideration of adverbs, which are so denominated, because they are generally the concomitants of verbs. Every thing relating to that part of speech, in the Greek tongue, may be seen in the Port Royal or any other Greek grammar. Instead therefore of dwelling upon this beaten topic, we shall hazard a conjecture upon a point to which the critics in the Greek tongue, as far as we know, have not hitherto adverted.

The most elegant and most admired writers of Greece, and especially Homer, and after him Hesiod, abound with small particles, which appear to us pure expletives, created as it were to promote harmony, or fill up a blank without sense or signification. How those

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ticles of
oriental
extraction.

(υ) Hence it came to signify rejoicing, from the mirth and revelry attending the treading of the vine-press.

Greek Language. those expletive particles should abound in that language beyond any other, we think, is a matter not easy to account for. It has been said by the Zoili, that if you extract these nonentities from the poems of that bard, *qui solus meruit dici poeta*, a magnum inane, a mighty blank would be left behind. We would willingly do justice to that pigmy race of words, and at the same time vindicate the prince of poets from that groundless imputation. Plato likewise, the prince of philosophers, has been often accused of too frequently employing these superfluous auxiliaries.

Those particles were no doubt imported from the east. It would be ridiculous to imagine that any description of men, however enthusiastically fond they might be of harmonious numbers, would sit down on purpose to fabricate that race of monosyllables purely to eke out their verses; mere sounds without significance. In the first place, it may be observed, that there is a very strict connection among the particles of all cognate languages. To this we may add, that the not understanding the nature, relations, signification, and original import of those seemingly unimportant terms, has occasioned not only great uncertainty, but numberless errors in translating the ancient languages into the modern. The Greek language in particular loses a considerable part of its beauty, elegance, variety, and energy, when these adverbial particles with which it is replete are not thoroughly comprehended. An exact translation of these small words, in appearance insignificant, would throw new light not only on Homer and Hesiod, but even upon poets of a much posterior date. Particles, which are generally treated as mere expletives, would often be found energetically significant. It is, however, altogether impossible to succeed in this attempt without a competent skill in the Hebrew, Chaldaic, Arabian, Persian, and old Gothic languages. We shall here take the liberty to mention a few of these particles which are most familiar, one or other of which occur in almost every line of Homer, and which we believe are either not understood or misunderstood. Such are *δα*, *δη*, *μεν*, *νυν*, *μην*, *γε*, *ετι*, *αρα*, *φα*, *γυν*. *δα* is nothing else but the Chaldaic particle *da*, the parent of the English *the*. It likewise signifies *by turns*, in your turn: *δη* is the same word in the Ionic dialect; *μεν* is a particle of the Hebrew affirmative *amen*, *fides*, *veritas*. *Μην*, a kind of oath by the moon called *mana*, almost over all the east; hence Dor. *μην*; *γε*, an oath by *γεια*, that is, *the earth*; *αρα*, another oath by the same element, probably from the oriental word of the same import; *φα* is a fragment of *αρα* mentioned before; *γυν*, of *γεια* the *earth*, and *Ον* or *Ων*, an Egyptian name of the sun; *Ως* *as*, a particle which pervades all the dialects of the Gothic language. In this manner we believe all these small words that occur so frequently in the Greek tongue, and which have hitherto been held inexplicable, may be easily rendered in significant terms: and were this done, we believe they would add both beauty and energy to the clauses in which they stand. But this discussion must be left to more accomplished adepts.

We shall not explain the nature of prepositions, because we are convinced that few people will take the trouble to peruse this disquisition who are not already acquainted with their import in language. The Greek prepositions are eighteen in number, which need not

be enumerated here. Most of these might be easily shown to be particles, or fragments deduced from oriental or Gothic words. The use of these words is to connect together terms in discourse, and to show the relation between them. In languages where, as in English, all these relations are expressed without any change on the termination of the nouns to which they are prefixed, the process is natural and easy. The whole is performed by juxtaposition. But in the Greek and Latin tongues, this effect is produced, partly by prefixing prepositions and partly varying the terminations of nouns. Had the Greeks been able to intimate all those relations by varying the terminations, or had they multiplied their prepositions to such a number as would have enabled them to express these relations without the casual variations, as the northern languages have done; in either case their language would have been less embarrassing than it is in its present state. According to the present arrangement both prepositions and the casual variations are used promiscuously to answer that purpose; a method which appears to us not altogether uniform. Though this plan might occasion little embarrassment to natives, it must, in our opinion, have proved somewhat perplexing to foreigners. The difficulty would be, as to the latter, when to adopt the one and when the other expedient.

Another inconvenience arises from the exceeding small number of prepositions in that language, which bear too small a proportion to the great variety of relations which they are appropriated to intimate. This deficiency obliged them often to employ the same preposition to denote different relations: For instance, *Επι* intimates, 1st, *upon*; as *επι τῷ λίθῳ*, *upon the stone*; and then it takes the genitive. 2d, It denotes *near upon*; as *επιτ' ὧ λίθῳ*, and then it governs the dative. 3d, The same preposition signifies *motion towards*; as *Επισιν ἐπὶ τὸν λίθον*, *he fell upon the stone*. In these instances the same preposition intimates three different relations; and, which is still more embarrassing, each of these requires a different case. The difficulty in this instance is so considerable, that even the most accurate of the Greek writers themselves often either forget or neglect the true application. Many examples of this might be adduced, did the limits assigned us admit such illustrations. Every man who has carefully perused the Grecian authors will readily furnish himself with examples.

Again, some prepositions, which indicate different relations, are prefixed to the same case. Thus, *Εξ* used, signifies *from*; as, *Εκ Διὸς Ἀρχομένη*, *from Jupiter we begin*; *ἀπ' ἐμοῦ βίου*, *from my life*, or *my course of life*; *πρὸ τῶν θυρῶν*, *before the doors*; *πρὸ νίκης ἐγκωμίου*, *an encomium before the victory*; *Ἀντὶ ἀγαθῶν ἀποδιδόναι κακά*, *to render evil for good*; *ἀντισσὺν*, *against you*. In these examples, and indeed every where, those prepositions intimate different relations, and yet are prefixed to the same cases. Sometimes the same preposition seems to assume two opposite significations: this appears from the preposition *ἀντὶ* just mentioned, which intimates both *for*, *instead of*, and *against* or *opposite to*.

What has been observed with respect to the prepositions above mentioned, the reader will readily enough apply to *Κατὰ*, *Μετὰ*, *Διὰ*, *Περί*. These incongruities certainly imply something irregular; and seem to inti-

mate

mate that those anomalies were so deeply incorporated with the constitution of the language, that the subsequent improvers found it impossible to correct them. Indeed to prefix a preposition to a case already distinguished by the affixed termination, appears to us a superfluity at least, if not an absurdity; for certainly it would have been more natural to have said *ἐκ ζεύς ἀρχομένη*, than *ἐκ Διὸς ἀρχομένη*. Some very learned men, who have inquired into the origin of language, have been of opinion that prepositions were the last invented species of words. If this opinion is well founded, we may suppose (and we think that this supposition is not altogether improbable) that the casual terminations of the Greek language were first affixed to the radix, in the manner above exhibited; and that prepositions were afterwards fabricated and prefixed to the cases already in use.

The syntax or construction of the Greek language does not, according to our plan, come within the compass of our present inquiry. This the curious Greek student will easily acquire, by applying to the grammars composed for that purpose. We have already hazarded a few conjectures with respect to the formation of the most important and most distinguished classes of words into which it has been divided by the most able grammarians, without, however, descending to the minutiae of the language. As prepositions are the chief materials with which its other words, especially verbs, are compounded, we shall briefly consider the order in which they probably advanced in this process.

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Complex ideas are compounded of a certain number or collection of simple ones. Of those complex notions, some contain a greater and some a smaller number of simple conceptions. In language, then, there are two ways of expressing those complex ideas, either by coining a word to express every simple idea separately, according to the order in which they stand in the mind; or by trying to combine two or more simple terms into one, and by that method to intimate one complex idea by one single word. The Arabians, notwithstanding all the boasted excellencies of their language, have never arrived at the art of compounding their words, in order to answer this noble purpose; and the sister dialects are but slenderly provided with this species of vocables. The Greeks, of all other nations (except perhaps those who spake the Sanscrit language), are unrivalled in the number, variety, propriety, elegance, energy, and expression of their compound terms. The Greeks, like the Arabians, in the earliest stages of their language, had only a collection of radical disjointed words, consisting of the jargons of the aboriginal Greeks, of the Pelasgi, Thracians, &c. How these words were arranged and constructed, we have no data remaining upon which we can found a critical investigation. We must therefore remain satisfied with such probable conjectures as the nature of the case, and the analogy of the language, seem to suggest.

The prepositions were originally placed before the nouns, whose relations they pointed out. For example, let us take the *ἐναπέθανετο τοῖς ἄλλοις*, *he died along with the rest*, or *he died out of hand along with the others*. These words were arranged thus: *ἀπέθανετο συν τοῖς ἄλλοις*; and *ἀπο-θνήσκον συν τοῖς ἄλλοις*. In this manner

the parts of every compound word were placed separately, at least as much as other words which had no connection.

The first compound words of the Greek language were the radical nouns with the article, and the radical part of the substantive or auxiliary verb. The success of this experiment encouraged them to attempt the same in other words. By this noble invention they found themselves able to express, in one word, with ease and significancy, what in other languages, and formerly in their own, required a tedious ambages or circumlocution. In process of time, as their language was gradually mellowed, they increased the number of their compounds, till their language, in that respect, infinitely excelled all its parent dialects. In this process they were careful to unite such letters as not only prevented asperity and difficulty of pronunciation, but even promoted harmony and elegance. But this was the labour of posterior ages.

The Greeks were entirely ignorant of the derivation or etymology of their language: for this we need only consult Plato's *Cratylus*, Aristotle's *Rhetoric*, Demetrius Phalereus, Longinus, &c. In deducing patronymics, abstracts, possessives, gentiles, diminutives, verbals, &c. from radicals of every kind, they have shown the greatest art and dexterity. Examples of this occur almost in every page of every Greek author. But this extended no farther than their own language; every foreign language was an abomination to the Greeks. But more of this in the sequel.

The original materials of the Greek tongue were undoubtedly rough and discordant, as we have described them above. They had been collected from different quarters, were the produce of different countries, and had been imported at very distant periods. It would therefore be an entertaining, if not an instructing, speculation, if it were possible to discover by what men and by what means this wonderful fabric was founded, erected, and carried to perfection. The writers of Greece afford us no light. Foreigners were unacquainted with that originally insignificant canton. Every thing beyond Homer is buried in eternal oblivion. Orpheus is indeed reported to have composed poems; but these were soon obliterated by the hand of time. The verses now ascribed to that philosophical hero are none of his*. Linus wrote, in the Pelasgic dialect, the achievements of the first Bacchus; *Tamyras* the Thracian wrote; and *Pronapides* the master of Homer was a celebrated poet. The works of all these bards did not long survive; and it is a certain fact that the Greek tongue was highly polished even more early than the age in which these worthies flourished. Homer, no doubt, imitated their productions, and some are of opinion that he borrowed liberally from them. The Greeks knew no more of the original character of their language than of the original character and complexion of their progenitors. They allowed, indeed, that their language was originally barbarous and uncouth; but by what means or by what persons it was polished, enriched, and finally arranged, was to them an impenetrable secret.

We have already demonstrated that the Ionim or aborigines of Greece were a race of barbarians; that consequently their language, or rather their jargon, was of the same contexture. The Pelasgi found both the

the people and their speech in this uncultivated state. These people arrived in Greece about the year before Christ 1760. It was then that the language of Greece began to be cultivated. Before the age of Homer the work seems to have been completed. Nothing of consequence was afterwards added to the original stock; on the contrary, not a few moietyies were deducted from the Homeric treasure. The Pelasgi, as was said before, arrived in Greece *an. ant. Chr. 1760*. Homer is thought to have been born *an. ant. Chr. 1041*; consequently the cultivation of the Greek tongue was completed in a period of about 700 years. But upon the supposition that Orpheus, Linus, Tamyris, &c. wrote long before Homer, as they certainly did, that language was arrived nigh the standard of perfection two centuries before; by which computation the period of its progress towards its stationary point is reduced to 500 years. But as the Pelasgi were a colony of foreigners, we ought to allow them one century at least to settle and incorporate with the natives, and to communicate their language, laws, manners, and habits, to the aborigines of the country. By this deduction we shall reduce the term of cultivation to less than four centuries.

During this period Greece was furiously agitated by tumults and insurrections. That country was divided into a number of independent states, which were perpetually engaged in quarrels and competitions. The profession of arms was absolutely necessary for the protection and preservation of the state; and the man of conduct and prowess was honoured as a demi-god, and his exploits transmitted with éclat to posterity. The Greek tongue was then rough and unpolished; because, like the ancient Romans, the bravest men were more disposed to act than to speak. Every language will take its colour from the temper and character of those who employ it; and had it not been owing to one class of men, the Greek tongue would have continued equally rough to the era of Homer as it had been a century after the arrival of the Pelasgi.

There has appeared among barbarous or half-civilized people a description of men whose profession it has been to frequent the houses or palaces of the great, in order to celebrate their achievements, or those of their ancestors, in the sublimest strains of heroic poetry. Accordingly we find that the Germans had their *bards*, the Gauls their *fads*, the Scandinavians their *scalds* or *scaldres*, the Irish their *fileas*, all retained for that very purpose. They lived with their chieftains or patrons; attended them to battle; were witnesses of their heroic deeds; animated them with martial strains; and celebrated their prowess if they proved victorious; or, if they fell, raised the song of woe, and chanted the mournful dirge over their sepulchres. These bards were always both poets and musicians. Their persons were held sacred and inviolable. They attended public entertainments, and appeared in all national conventions. The chief of them were employed in the temples of the gods; and the less illustrious, like our minstrels of old, strolled about from place to place, and exercised their functions wherever they found employment.

Among the ancient Greeks there was a numerous tribe of men of the very same description, who were at once poets and musicians, and whose office it was

to celebrate the praises of the great, and to transmit their exploits to posterity in the most exaggerated encomiums. These poetical vagrants were styled *Aoidoi* or songsters. Some of these lived in the houses of great men; while others, less skilful or less fortunate, strolled about the country in the manner above described. The more illustrious of those *Aoidoi* who were retained in the temples of the gods, were certainly the first improvers of the language of the Greeks. Among the Hebrews, we find the first poetical compositions were hymns in honour of Jehovah, and among the pagans the same practice was established. In Greece, when all was confusion and devastation, the temples of the gods were held sacred and inviolable. There the *Aoidoi* improved their talents, and formed religious anthems on those very models which their progenitors had chanted in the east.

The language of the Greeks was yet rugged and unmellowed: their first care was to render it more soft and more flexible. They enriched it with vocables suited to the offices of religion; and these we imagine were chiefly imported from the east. Homer every where mentions a distinction between the language of gods and men. The language of gods imports the oriental terms retained in the temples, and used in treating of the ceremonies of religion; the language of men intimates the ordinary civil dialect which sprung from the mixed dialects of the country. The priests, no doubt, concurred in promoting this noble and important purpose. From this source the strolling *Aoidoi* drew the rudiments of their art; and from these last the vulgar deduced the elements of a polished style.

To these *Aoidoi* of the superior order we would ascribe those changes mentioned in the preceding part of this inquiry, by which the Greek tongue acquired that variety and flexibility, from which two qualities it has derived a great share of that ease, beauty, and versatility, by which it now surpasses most other languages. The diversity of its terminations furnishes a most charming variety, while at the same time the sense is communicated to the reader or hearer by the relation between them. By this economy the poet and the orator are left at liberty to arrange their vocables in that order which may be most soothing to the ear, and best adapted to make a lasting impression on the mind.

Few colonies have emigrated from any civilized country without a detachment of priests in their train. The supreme powers, whoever they were, have always been worshipped with music and dancing. The Hebrews, Phœnicians, and Egyptians, delighted in these musical and jocund festivals. The priests who attended the Iones, Dories, Æolians, Thebans, Athenians, &c. from the east, introduced into Greece that exquisite taste, those delicate musical feelings, which distinguished the Greeks from all the neighbouring nations. Hence that numerous race of onomatopœas, by which the Greek language is invested with the power of expressing almost every passion of the human soul, in such terms as oblige it to feel and actually to assimilate to the passion it would excite. Numberless instances of this occur in every page of Homer, Hesiod, Pindar, Sophocles, Euripides, and even of Aristophanes: to quote instances would be to insult the Greek student.

Greek
Language.

Every body knows that the practice of writing in verse was antecedent to the date of prosaic composition. Here, then, the *Aoidoi* and the ministers of religion chiefly displayed their skill and discernment. By a judicious mixture of short and long syllables; by a junction of consonants which naturally slide into each other; by a careful attention to the rhythm, or harmony resulting from the combination of the syllables of the whole line—they completed the metrical tone of the verse, guided by that delicacy of musical feeling of which they were possessed before rules of prosody were known among men.

Much liberty was certainly used in transposing letters, in varying terminations, in annexing prefixes and affixes, both to nouns and other kinds of words where such adjuncts were possible: and upon this occasion we think it probable, that those particles of which we have spoken above were inserted like filling stones thrust in to stop the gaps or chinks of a building. Verses were then clumsy and irregular, as the quantity of vowels was not duly ascertained, and the collision of heterogeneous consonants not always avoided. Probably these primitive verses differed as widely from the finished strains of Homer and his successors, as those of Chaucer and Spencer do from the smooth polished lines of Dryden and Pope.

The poetical compositions of the earliest Greeks were not, we think, in the hexameter style. As they were chiefly calculated for religious services, we imagine they resembled the Hebrew iambics preserved in the song of Aaron and Miriam, Deborah and Barak, Psalms, Proverbs, &c. which were indeed calculated for the same purpose. Archilochus perhaps imitated these, though the model upon which he formed his iambics was not generally known. The later dramatic poets seem to have copied from the same archetypes. Hexameters, it is probable, were invented by Orpheus, Linus, Tamyris, Musæus, &c. The first of these travelled into Egypt, where he might learn the hexameter measure from that people, who used to bewail *Maneros* and *Osiris* in elegiac strains. This species of metre was first consecrated to theology, and the most profound sciences of moral and natural philosophy; at length it was brought down to celebrate the exploits of kings and heroes.

*Res gestas regumque, ducumque et fortia bella,
Quo scribi possent numero monstravit* Homerus.

We have hazarded a conjecture above, importing that the earliest poetical compositions of the Greeks were consecrated to the service of the gods. We shall now produce a few facts, which will furnish at least a presumptive evidence of the probability of that conjecture.

Orpheus begins his poem with ancient chaos, its transformations and changes, and pursues it through its various revolutions. He then goes on to describe the offspring of Saturn, that is time, the æther, love, and light. In short, his whole poem is said to have been an oriental allegory, calculated to inspire mankind with the fear of the gods, and to deter them from murder, rapine, unnatural lusts, &c.

Musæus was the favourite scholar of Orpheus, or perhaps his son. He composed prophecies and hymns,

and wrote sacred instructions, which he addressed to his son. He prescribed atonements and lustrations; but his great work was a Theogony, or History of the Creation, &c.

Melampus brought the mysteries of Proserpine from Egypt into Greece. He wrote the whole history of of the disasters of the gods. This seer is mentioned by Homer himself.

Olen came from Lycia, and composed the first hymn that was sung in Delos at their solemnities; he probably emigrated from Patara a city of Lycia, where Apollo had a celebrated temple and oracle.

The Hyperborean damsels used to visit Delos, where they chanted sacred hymns in honour of the Delian god.

To these we add the great Homer himself, if indeed the hymns commonly annexed to the *Odyssey* are his composition. Hesiod's Theogony is too well known to need to be mentioned.

From these instances we hope it appears, that the origin of the poetry of Greece is to be found in the temples; and that there, its measure, numbers, rhythm, and other appendages were originally fabricated.

The Grecian poets, however, enjoyed another advantage which that class of writers have seldom possessed, which arose from the different dialects into which their language was divided. All those dialects were adopted indifferently by the prince of poets; a circumstance which enabled him to take advantage of any word from any dialect, provided it suited his purpose. This, at the same time that it rendered versification easy, diffused an agreeable variety over his composition. He even accommodated words from Macedonia, Epirus, and Illyricum, to the purposes of his versification: Besides, the laws of quantity were not then clearly ascertained; a circumstance which afforded him another convenience. Succeeding poets did not enjoy these advantages, and consequently have been more circumscribed both in their diction and numbers.

The Greek language, as is generally known, was divided into many different dialects. Every sept, or petty canton, had some peculiar forms of speech which distinguished it from the others. There were, however, four different dialectical variations which carried it over all the others. These were the Attic, Ionic, Æolic, and Doric. These four dialectical distinctions originated from the different countries in the east from which the tribes respectively emigrated. The Attics consisted, 1st, of the barbarous aborigines; 2d, of an adventitious colony of Egyptian Saïtes; 3d, a branch of Ionians from the coast of Palestine. These last formed the old Ionian dialect, from which sprung the Attic and modern Ionic. The Æolians emigrated from a different quarter of the same coast; the inhabitants of which were a remnant of the old Canaanites, and consequently different in dialect from the two first mentioned colonies. The Dorians sprang from an unpolished race of purple fishers on the same coast, and consequently spoke a dialect more coarse and rustic than any of the rest. These four nations emigrated from different regions; a circumstance which, in our opinion, laid the foundation of the different dialects by which they were afterwards distinguished.

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Orpheus.

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Musæus.

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Melampus.

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Olen.

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Homer and

Hesiod.

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Different

dialects,

with their

origin.

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It is impossible in this short sketch to exhibit an exact view of the distinguishing features of each dialect. Such an analysis would carry us far beyond the limits of the article in question. For entire satisfaction on this head, we must refer the Grecian student to Mattaire's *Græcæ Linguae Dialecti*, where he will find every thing necessary to qualify him for understanding that subject. We shall content ourselves with the few observations following.

The Athenians being an active, brisk, volatile race, delighted in contractions. Their style was most exquisitely polished. The most celebrated authors who wrote in that dialect were the following: Plato, Thucydides, Xenophon, Demosthenes, and the other orators; Æschylus, Euripides, Sophocles, Aristophanes, Menander, Diphilus, with the other comic and tragic poets. That dialect was either ancient or modern. The ancient Attic was the same with the Ionic.

The Ionic, as was said, was the ancient Attic; but when that nation emigrated from Attica and settled on the coast of Asia Minor, they mingled with the Carians and Pelasgi and of course adopted a number of their vocables. They were an indolent, luxurious, and dissolute people; of course their style was indeed easy and flowing, but verbose, redundant, and without nerves. This, however, is the leading style in Homer; and after him a prodigious number of writers on every subject have used the same dialect, such as Herodotus of Halicarnassus the celebrated historian; Ctesias of Cnidus the historian of Persia and India; Hecataeus of Miletus; Megasthenes the historian, who lived under Seleucus Nicator; Hippocrates the celebrated physician of Coos; Hellanicus the historian often mentioned with honour by Polybius; Anacreon of Teia; Alceus, Sappho of Lesbos, excellent poets; Pherecydes Syrus the philosopher, and a multitude of other persons of the same profession, whom it would be superfluous to mention upon the present occasion.

The Æolic and Doric were originally cognate dialects. When the Dorians invaded Peloponnesus and settled in that peninsula, they incorporated with the Æolians, and their two dialects blended into one produced the new Doric. The original Dorians inhabited a rugged mountainous region about Ossa and Pindus, and spoke a rough unpolished language similar to the soil which they inhabited. Andreas Schottus, in his observations on poetry, l. 2. cap. 50. proves from an old manuscript of "Theocritus, that there were two dialects of the Doric tongue, the one ancient and the other modern; that this poet employed Ionic and the modern Doric; that the old Doric dialect was rough and cumbrous; but that Theocritus has adopted the new as being more soft and mellow." A prodigious number of poets and philosophers wrote in this dialect, such as Epicharmus the poet; Ibycus the poet of Rhegium; Corinna the poetess of Thepis, or Thebes, or Corinth, who bore away the prize of poetry from Pindar; Erynnæ a poetess of Lesbos; Moschus the poet of Syracuse; Sappho the poetess of Mitylene; Pindarus of Thebes the prince of lyric poets; Archimedes of Syracuse the renowned mathematician; and almost all the Pythagorean philosophers. Few historians wrote in that dialect; or if they did, their works have not

fallen into our hands. Most of the hymns sung in temples of the gods were composed in Doric; a circumstance which evinces the antiquity of that dialect, and which, at the same time, proves its affinity to the oriental standard.

After that the Greek tongue was thoroughly polished by the steps which we have endeavoured to trace in the preceding pages, conscious of the superior excellency of their own language, the Greeks, in the pride of their heart, stigmatized every nation which did not employ their language with the contemptuous title of *barbarians*. Such was the delicacy of their pampered ears, that they could not endure the untutored voice of the people whom they called *Βαρβαροί*.

This extreme delicacy produced three very pernicious effects; for, 1st, it induced them to metamorphose, and sometimes even to mangle, foreign names, in order to reduce their sound to the Grecian standard; and, 2d, it prevented their learning the languages of the east, the knowledge of which would have opened to them an avenue to the records, annals, antiquities, laws, customs, &c. of the people of those countries, in comparison of whom the Greeks themselves were of yesterday, and knew nothing. By this unlucky bias, not only they, but even we who derive all the little knowledge of antiquity we possess through the channel of their writings, have suffered an irreparable injury. By their transformation of oriental names they have in a manner stopped the channel of communication between the histories of Europe and Asia. This appears evident from the fragments of Ctesias's Persian history, from Herodotus, Xenophon, and all the other Grecian writers who have occasion to mention the intercourse between the Greeks and Persians. 3d, It deprived them of all knowledge of the etymology of their own language, without which it was impossible for them to understand its words, phraseology, and idioms, to the bottom. We mentioned Plato's Cratylus above. In that dialogue, the divine philosopher endeavours to investigate the etymology of only a few Greek words. His deductions are absolutely childish, and little superior to the random conjectures of a school-boy. Varro, the most learned of all the Romans, has not been more successful. Both stumbled on the very threshold of that useful science; and a scholar of very moderate proficiency in our days knows more of the origin of these two noble languages, than the greatest adepts among the natives did in theirs. By prefixes, affixes, transpositions of letters, new conjunctions of vowels and consonants for the sake of the music and rhythm, they have so disguised their words, that it is almost impossible to develop their original. As a proof of this, we remember to have seen a manuscript in the hands of a private person where the first twelve verses of the Iliad are carefully analysed; and it appears to our satisfaction that almost every word may be, and actually is, traced back to a Hebrew, Phœnician, Chaldean, or Egyptian original: And we are convinced that the same process will hold good in the like number of verses taken from any of the most celebrated poets of Greece. This investigation we found was chiefly conducted by reducing the words to their original inviolable state, which was done by stripping them of

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The partiality of the Greeks to their own tongue, and its evil consequences.

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Beauty of
the Greek
language.

prefixes, affixes, &c. These strictures are, we think, well founded; and consequently need no apology to protect them.

These imperfections, however, are counterbalanced by numberless excellencies: and we are certainly much more indebted to that incomparable people for the information they have transmitted to us through the medium of their writings, than injured by them in not conveying to us and to themselves more authentic and more ample communications of ancient events and occurrences. Without fatiguing our readers with superfluous encomiums on a language which has long ago been extolled perhaps to an extravagant degree by the labours of men of the most enlarged capacity and the most refined taste, we shall now proceed to make a few observations on *spirits* and *accents*; which being rather appendages than essentials of the language, we have on purpose reserved for the last place.

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The spiri-
tus asper
and lenis.

Every word in the Greek language beginning with a vowel is marked with a spirit or breathing: This aspiration is double, namely *lenis et asper*, "the gentle, and rough or aspirated." The gentle accent, though always marked, is not now pronounced, though in the earliest periods of the language it was undoubtedly enounced, though very softly. Both these aspirations were imported from the east. They were actually the Hebrew *h* and *heth*. The former denoted the *spiritus lenis*, and the latter the *spiritus asper*. The Hebrew prefixed *ha* or *he* to words beginning with a vowel, and of course the Greeks followed their example. These people seem to have delighted in aspirates; and of consequence the letter *σ* is, some think, rather too often affixed to the terminations of their words. Every word beginning with *ρ* had the aspirate joined to *ρ*, probably with a design to render the aspiration still more rough.

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The ac-
cents.

The Greek accents are three in number; the acute, the grave, and the circumflex. The acute raises and sharpens the voice; the grave depresses and flattens it; the circumflex first raises and sharpens the voice, and then depresses and flattens it. It is obviously composed of the other two. The learned author of the *Origin and Progress of Language* has taken much pains to prove that these accents were actually musical notes, invented and accommodated to raise, depress, and suspend the voice, according to a scale of musical proportions. It is scarce possible, we think, for a modern Greek scholar to comprehend distinctly the ancient theory of accents. These the native Greeks learned from their infancy, and that with such accuracy, that even the vulgar among the Athenians would have hissed an actor or actress off the stage or an orator off the pulpitum,†, on account of a few mistakes in the enunciation of those notes.

† See Pul-
gitum.

These elevations, depressions, and suspensions of the voice upon certain syllables, must have made their language sound in the ears of foreigners somewhat like recitative, or something nearly resembling *cant*. But the little variety of those syllabic tones, and the voice not resting upon them, but running them on without interruption, sufficiently distinguished them from music or *cant*. Be that as it may, we think it highly probable, that the wonderful effects produced by the harangues of the orators of Greece on the en-

raptured minds of their hearers, were owing in a good measure to those artificial musical tones by which their syllables were so happily diversified.

Greek
Language

To this purpose we shall take the liberty to transcribe a passage from Dion. Halic. *De Structura Orationis*, which we find translated by the author of the *Origin and Progress of Language*, vol. ii. book 3d, part ii. chap. 7. page 381. "Rhetorical composition is a kind of music differing only from song or instrumental music, in the degree, not in the kind; for in this composition the words have melody, rhythm, variety, or change, and what is proper or becoming: So that the ear in it, as well as in music, is delighted with the melody, moved by the rhythm, is fond of variety, and desires with all these what is proper and suitable. The difference, therefore, is only of greater and less."

With respect to accents, it may be observed that only one syllable of a word is capable of receiving the acute accent, however many there be in the word. It was thought that the raising the tone upon more than one syllable of the word, would have made the pronunciation too various and complicated, and too like chanting.

The *grave accent* always takes place when the acute is wanting. It accords with the level of the discourse; whereas the acute raises the voice above it.

The *circumflex accent* being composed of the other two, is always placed over a long syllable, because it is impossible first to elevate the voice and then to depress it on a short one. Indeed among the Greeks a long syllable was pronounced like two short ones; and we apprehend it was sometimes written so, especially in later times. It is altogether obvious from two learned Greek authors, Dion. Halic. and Aristoxenus, that the Greek accents were actually musical notes, and that these tones did not consist of loud and low, or simply elevating and depressing the voice; but that they were uttered in such a manner as to produce a melodious rhythm in discourse.

In a word, the acute accent might be placed upon any syllable before the antepenult, and rose to a *fifth* in the diatonical scale of music; the grave fell to the third below it. The circumflex was regulated according to the measure of both, the acute always preceding. The grave accent is never marked except over the last syllable. When no accent is marked, there the grave always takes place. Some words are called *enclitics*. These have no accent expressed, but throw it back upon the preceding word. The circumflex, when the last syllable is short, is often found over the penult, but never over any other syllable but the last or the last but one.

The ancient Greeks had no accentual marks. They learned those modifications of voice by practice from their infancy; and we are assured by good authority, that in pronunciation they observe them to this day. The accentual marks are said to have been invented by a famous grammarian, Aristophanes of Byzantium, keeper of the Alexandrian library under Ptolemy Philopater, and Epiphanes, who was the first likewise who is supposed to have invented punctuation. Accentual marks, however, were not in common use till about the seventh century; at which time they are found in manuscripts. If our curious readers would wish to enter more deeply into the theory of accents, we must

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The an-
cient Greeks
had no ac-
centual
marks.

^{Greek Language.} must remit them to Origin of Language, vol. ii. l. 2. ^{passim}; and to Mr Foster's Essay on the different Nature of Accent and Quantity.

Such, in general, are the observations which we thought the nature of our design obliged us to make on the origin and progress of the Greek language. Some of our more learned readers may perhaps blame us for not interspersing the whole disquisition with quotations from the most celebrated writers in the language which has been the object of our researches. We are well aware that this is the general practice in such cases. The books were before us, and we might have transcribed from them more quotations than the nature of an article of this kind would permit. In the first part there were no books in that language to quote from, because the Greeks knew nothing of their own origin, nor of that of their language, and consequently have recorded nothing but dreams and fictions relating to that subject. Even when we had made considerable progress in our inquiry, the nature of the plan we have adopted excluded in a great measure the use of quotations. When we drew near the conclusion, we imagined that our learned readers would naturally have recourse to the passages alluded to without our information, and that the unlearned would not trouble themselves about the matter. The Greek student who intends to penetrate into the depths of this excellent language, will endeavour to be thoroughly acquainted with the books after mentioned.

¹⁷⁶ Books to be studied by every one who wishes to be a master of this language. Aristotle's Rhetoric and Poetics, his book *De Interpretatione*, especially with Ammonius's Commentary. Ammonius was a native of Alexandria, and by far the most acute of all the ancient grammarians.

Dion. Halic. *De Structura Orationis*, where, amidst a bundance of curious and interesting observations, will be found the true pronunciation of the Greek letters.

Demetrius Phalereus *De Elocutione*; a short essay indeed, but replete with instruction concerning the proper arrangement of words and members in sentences.

Longinus, the prince of critics, whose remains are ^{See Gazo.} above commendation. Theodorus Gaza† and the other refugees from Constantinople, who found an hospitable reception from the munificent family of the Medici, and whose learned labours in their native language once more revived learning and good taste in Europe. These, with some other critics of less celebrity, but equal utility, will unlock all the treasures of Grecian erudition, without however disclosing the source from which they flowed. To these one might add a few celebrated moderns, such as Mons. Fourmont the Elder, Mons. Gebelin, Abbé Pezron, Salmasius, and especially the learned and industrious Lord Monbodo.

We shall now give a very brief account of the vast extent of the Greek language even before the Macedonian empire was erected; at which period, indeed, it became in a manner universal, much more than ever the Latin language could accomplish notwithstanding the vast extent of the Roman empire.

¹⁷⁷ Vast extent of the Greek language. Greece, originally Hellas, was a region of small extent, and yet sent out many numerous colonies into different parts of the world. These colonies carried their native language along with them, and industriously diffused it wherever they formed a settlement. The Ionians,

Æoles, and Dorians, possessed themselves of all the west and north-west coast of the Lesser Asia and the adjacent islands; and there even the barbarians learned that polished language. The Greek colonies extended themselves along the south coast of the Euxine sea as far as Sinope, now Trebizund, and all the way from the west coast of Asia Minor: though many cities of barbarians lay between, the Greek tongue was understood and generally spoken by people of rank and fashion.

There were Greek cities on the north coast of the Euxine sea to the very eastern point, and perhaps beyond even those limits; likewise in the Taurica Chersonesus, or Crim Tartary; and even to the mouth of the Danube, the straits of Caffa, &c. In the neighbourhood of all these colonies, the Greek language was carefully propagated among the barbarians, who carried on commerce with the Greeks.

A great part of the south of Italy was planted with Greek cities on both coasts; so that the country was denominated *Magna Græcia*. Here the Greek tongue universally prevailed. In Sicily it was in a manner vernacular. The Ionians had sent a colony into Egypt in the reign of Psammitichus; and a Greek settlement had been formed in Cyrenia many ages before. The Phocians had built Massilia or Marseilles as early as the reign of Cyrus the Great, where some remains of the Greek language are still to be discovered. Cæsar tells us, that in the camp of the Helvetii regilters were found in Greek letters. Perhaps no language ever had so extensive a spread, where it was not propagated by the law of conquest.

The Greek tongue, at this day, is confined within very narrow limits. It is spoken in Greece itself, except in Epirus, and the western parts of Macedonia. It is likewise spoken in the Grecian and Asiatic islands in Candia or Crete, in some parts of the coast of Asia Minor, and in Cyprus: but in all these regions, it is much corrupted and degenerated.

As a specimen, we shall insert a modern Greek song, and the advertisement of a quack medicine, which, with other plunder, was brought by the Russians from Chocim or Chotzim in 1772.

Song in modern Greek.

ΜΙ δυσκίαις πολέμῳ μὲ βάσανα ὡς τὸ ληρό
Εἶμαι, καὶ κενταύῳ, καὶ τὰ χαθὰ κοινῶ
Στὸ πῆλαγος τῶν συμφορῶν μὲ ἱπικίνδυνον καιρὸν
Μ' ἀνέμης ὀλέθρης σφοδρῆς καὶ ἐναντίας.
Με κίματα πολλὰ καὶ μὴν τῆ φανὶ ἀναστεναγμῶν.
Θαλασσα φθορομένη, πόλλα ἀγχομένη,
Ὅτ' ἀφρίζει καὶ φρεσὶ μὲ σαγμανάκια περισσά
Σύνερα σκοτισμένα καὶ κατασυγχισμένα,
Καὶ τὰ φανὶ μὲ σωτηρία, τὰ ἰδὼν τὰ μάτια μου.
Γλίχα νερὰ τὰ εὖρω, κάσχα καὶ δὴν ἡξέω,
Ν' ἀράξω καὶ δὴν ἡμπορῶ γιὰτι λιμένα δὴν ἴδω.
Μ' ἀτελπισίαν θρέχω οὔτ' ἀρετὴν πῶ ἔχω.
Πᾶ μὲ αὐτὰ καὶ τὰ πινυῶ ἢ σιλαμένεινα εὖγῶ,
Καὶ τὸτα αἰ βασιλεῖς, ἡμπορῶν τὰ μὲ φυλάξω.

Translation.

With dire misfortunes, pains, and woes,
O'erwhelm'd, ingulph'd, I struggling fight;
O'er my frail bark proud billows close
To plunge her deep in lasting night.

Rough

¹⁷⁸ Greek spoken at present.

Rough seas of ill incessant roar,
Fierce winds adverse, with howling blast,
Heave surge on surge. Ah! far from shore
My found'ring skiff shall sink at last.
Involv'd in low'ring darksome clouds,
'Mid sultry fogs, I pant for breath;
Huge foaming billows rend my shrouds,
While yawning gulphs extend beneath.
From bursting clouds loud thunders roll,
And deaf'ning peals terrific spread;
Red lightnings dart from pole to pole,
And burst o'er my devoted head.
When shall the friendly dawning rays
Guide me to pleasures once possess'd;
And breezy gales, o'er peaceful seas,
Waft to some port of endless rest?
In dark despair, with tempests tost,
I veer my sail from side to side.
Conduct me, Heav'n! to yond' fair coast,
Or plunge me in the 'whelming tide.

The Quack Bill.

ΒΑΣΙΛΑΜΟΝ ΤΗΣ ΊΕΡΟΥΣΑΛΗΜ, ΑΠΟ
ΤΑΙΣ, ΚΑΙ ΝΟΥΡΙΑΙΣ, ΚΑΙ
ΠΑΛΑΕΙΑΣ ΡΕΤΖΕΤΑΙΣ.

ΤΟΥΤΟ τὸ μπαλαμον ὠφελεῖ εἰς τὸ ἀδυνατὸν τομάχῳ,
καὶ βοηθεῖ τὴν χυνοῦσιν δυναμάνει τὴν καρδίαν. συγκώνει ὅλας
τὰς ἐμδράξεις τῆς κοιλίας ὠφελεῖ εἰς τὴν γένωσιν καὶ βῆχα πα-
λαιόν. Ἰατρεύει τὰς ἐσωτερικὰς πληγὰς τῆς γῆδης, καὶ τὰ πνεύ-
ματος ἥγουν πλεμονίᾳ. κινεῖ τὰ καταμήνια τῶν γυναικῶν. Ἐἰς
τὰς ἐξωτερικὰς πληγὰς πρέπει νὰ βάξεται μετὰ τὸ ξανθὸν τόσον
εἰς παλαιὰς. Ὅταν καὶ ἰσκιὰς, καθὼς εἶναι ἡ οπαδιὰς, καὶ
μαχαιριὰς, καὶ ἄλλα κοψίματα ἱατρεύει κατέλογησεν Φισολα,
καὶ ἄλλας τὰς βρομερὰς πληγὰς ὅπῃ ἐφθασαν εἰς τὸ κόκαλον
δαυμάσιος, ὠφελεῖ εἰς τὰ αὐτὰ ὅπῃ τρέχουν ἔμπυον νὰ τα-
ξεται ὁὐκ ἢ τρεῖς κόμπης ἥγουν σαλαγματίας μεβαμπάκι
βρεμίνον εἰς αὐτὸ, βάνεται εἰς τὰς πληγωμένας δοτοκοιλί-
αις καὶ θέλουν ἱατρεῦσθαι. καὶ ἀκόμι δυναμάνει τὰ ὀδόντια ὅπῃ
κινουὺνται καὶ θέλουν νὰ πείσουν. βοηθεῖ καὶ ἀπὸ τὴν πανέκλαν.
Ἡ δόσις ἐσωτερικῶς ὡς εἶναι δέκα ἢ καὶ δώδεκα κόμπης εἰς
ἐλάχιστον κρεσσὶ, ἢ καὶ νερόν, τὸ καθεὶ ταχυ καὶ βραδύ. ὡς τὸ μι-
ταχειρίζεται, καὶ εἰνα δαυμάσιον μετὴν δοκιμὴν βεβαιωμένον.
Ἀληθὲς Βάλαμον τῆ Βασιλεῦ.

Instead of giving a literal and bald translation of this advertisement, which runs exactly in the style of other quack bills, it may be sufficient to observe, that the medicine recommended is said, when taken inwardly, to raise the spirits, remove costiveness and inveterate coughs; to cure pains of the breast and belly-aches; to assist respiration, and remove certain female obstructions. When applied externally, it cures wounds and sores, whether old or fresh, removes ringing of the ears, fastens the teeth when loose, and strengthens the gums.

All this, and much more, it is said to do in a wonderful manner; and is declared to be the true royal balsam of Jerusalem, and an universal specific.

It is indeed next to a miracle that so many monuments of Grecian literature are still to be found among men. Notwithstanding the burning of the famous library of Alexandria, and the almost numberless wars, massacres, and devastations, which have from time to time in a manner desolated those countries where the Greek language once flourished; we are told that

there still remain about 3000 books written in that Greek Language.

We shall now conclude this section with a brief de-
tail of the most distinguished stages and variations distinguished
through which this noble tongue made its progress from the age of Homer to the taking of Constanti-
nople, *an. ant. Chr.* 1453; a period of more than 2000 years.

Homer gave the Greek poetry its colour and consistency, and enriched, as well as harmonized, the language. It seems, from the coincidence of epithets and cadence in Homer and Hesiod, that the Greek heroic verse was formed spontaneously, by the old *Aoidoi*, a sort of *improvisatori*; and that Homer and his first followers adopted their versification. The Iliad and Odyssey have much of the air of extempore compositions; an epithet is never wanting to fill up a verse; and a set of expressions are mechanically annexed to such ideas as were of frequent recurrence. Hence that copiousness and waste of words in the old Greek bard, which forms such a contrast to the condensed and laboured composition of Virgil.

The Greek prose was of a more difficult structure; and it may be distributed into different styles or degrees of purity. Of the prose-authors now extant, the first and best style is that of Herodotus, and of Plato in the florid or mixed kind, of Xenophon in the pure and simple, of Thucydides and Demosthenes in the austere. Nothing, perhaps, is so conducive to form a good taste in composition as the study of these writers.

The style of Polybius forms a new epoch in the history of the Greek language: it was the idiotic or popular manner of expression, especially among military men, in his time, about the 150th Olympiad. It became the model of succeeding writers, by introducing a simple unstudied expression, and by emancipating them from the anxious labour of the old Greeks respecting the cadence and choice of words. The style of the New Testament, being plain and popular, frequently resembles that of Polybius, as has been shown by Raphelius, and by Kirchmaier, *de parallelismo*. N. T. et Polybii, 1725.

Before this historian, the Alexandrian Jews had formed a new or Hellenistic style, resulting from the expression of oriental ideas and idioms in Greek words, after that language had lost of its purity, as it gained in general use, by the conquests of Alexander. The Hellenistic is the language of the Septuagint, the Apocrypha, the New Testament, and partly of Philo and Josephus. This mixture in the style of the evangelists and apostles, is one credential of the authenticity of the best of all books, a book which could not have been written but by Jewish authors in the first century. See the fine remarks of Bishop Warburton, *Doctrine of Grace*, book i. ch. 8—10. Critics lose their labour in attempting to adjust the Scripture-Greek to the standard of Atticism.

The diction of the Greek historians, and geographers of the Augustan age, is formed on that of Polybius; but improved and modernized, like the English of the present age, if compared with that of Clarendon or Bacon. More perspicuous than refined, it was well suited to such compilations as were then written by men of letters, such as Dionysius, Diodo-
rus,

Greek Language. rus, and Strabo, without much experience or rank in public life.

The ecclesiastical style was cultivated in the Christian schools of Alexandria, Antioch, and Constantinople; rank and luxuriant, full of oriental idioms, and formed in a great measure on the Septuagint version. Such is, for instance, the style of Eusebius. After him, the best Christian writers polished their compositions in the schools of rhetoric under the later Sophists. Hence the popular and flowing purity of St. Chrysostome, who has more good sense than Plato, and perhaps as many good words.

On the Greek of the Byzantine empire, there is a good dissertation by Ducange, *de causis corruptæ Græcitatæ*, prefixed to his Glossary, together with Portius's Grammar of the modern Greek. This last stage of the Greek language is a miserable picture of Turkish barbarism. And, which is most surprising, there is no city of Greece where the language is more different from the ancient than at Athens. The reason of that is, because it has been long inhabited by a mixed multitude of different nations.

To conclude, the Greeks have left the most durable monuments of human wisdom, fortitude, magnificence, and ingenuity, in their improvement of every art and science, and in the finest writings upon every subject necessary, profitable, elegant, or entertaining.

The Greeks have furnished the brightest examples of every virtue and accomplishment, natural or acquired, political, moral, or military: they excelled in mathematics and philosophy; in all the forms of government, in architecture, navigation, commerce, war: as orators, poets, and historians, they stand as yet unrivalled, and are like to stand so for ever; nor are they less to be admired for the exercises and amusements they invented, and brought to perfection, in the institution of their public games, their theatres, and sports.

130. No perfect translation of any Greek author. Let us further observe, that in vain our readers will look for these admired excellencies in any of the best translations from the Greek: they may indeed communicate some knowledge of what the originals contain; they may present you with propositions, characters, and events: but allowing them to be more faithful and more accurate than they really are, or can well be, still they are no better than copies, in which the spirit and lustre of the originals are almost totally lost. The mind may be instructed, but will not be enchanted: The picture may bear some faint resemblance, and if painted by a masterly hand give pleasure; but who would be satisfied with the canvas, when he may possess the real object? who would prefer a piece of coloured glass to a diamond? It is not possible to preserve the beauties of the original in a translation.—The powers of the Greek are vastly beyond those of any other tongue. Whatever the Greeks describe is always felt, and almost seen; motion and music are in every tone, and enthusiasm and enchantment possess the mind:

*Græcis ingenium, Græcis dedit ore rotundo,
Musa loqui.* Hor.

SECT. VIII. Of the Latin Language.

Latin Language.

THIS language, like every other spoken by barbarians, was in its beginning rough and uncultivated.—What people the Romans were, is a point in which antiquarians are not yet agreed. In their own opinion they were sprung from the Trojans*; Dion. Halicarn. derives them from the Greeks†; and Plutarch informs us‡ that some people imagined that they were sprung from the Pelasgi. The fact is, they were a mixture of people collected out of Latium and the adjacent parts, which a variety of accidents had drawn together, to establish themselves on that mountainous region, in order to secure their own property, and plunder that of their neighbours. They were in all probability composed of Arcadians, Sabines, Latins, Hetruscans, Umbrians, Oscans, Pelasgi, &c.; and if so, their language must have been a mixture of the different dialects peculiar to all these discordant tribes.

The Latin language ought then to be a mingled mass of the Arcadian, that is, the Æolian || Greek, || the Pelasgic, Hetruscan, and Celtic dialects. These jarring elements, like the people to whom they belonged respectively, gradually incorporated, and produced what was afterwards called the Latin tongue.

The Arcadians were a Pelasgic § tribe, and consequently spoke a dialect of that ancient Greek produced by the coalition of this tribe with the savage aborigines of Greece. This dialect was the groundwork of the Latin. Every scholar allows, that the Æolian Greek, which was strongly tinged with the Pelasgic, was the model upon which the Latin language was formed: From this deduction it appears, that the Latin tongue is much more ancient than the modern Greek; and of course we may add, that the Greek, as it stood before it was thoroughly polished, bore a very near resemblance to that language. Hence we think we may conclude, that the knowledge of the Latin language is necessary in order to understand the Greek. Let us not then expect to find the real ingredients of the Greek tongue in the academic groves of Athens, or in Smyrna, or in Rhodope, or in Hæmos; but on the banks of the Tiber and on the fields of Laurentum.

A very considerable part of the Latin tongue was derived from the Hetruscan. That people were the masters of the Romans in every thing sacred. From them they learned the ceremonies of religion, the method of arranging games and public festivals, the art of divination, the interpretation of omens, the method of lustrations, expiations, &c. It would, we believe, be easy to prove, that the Pelasgi* and Hetrusci (x) were the same race of people; and if this was the case, their languages must have differed in dialect only.

The Umbrian or Celtic enters deeply into the composition of the Latin tongue. For proof of this, we need only appeal to Pelloutier, *Bullet's Mémoires de la Langue Celtique, partie première*, Abbé Perizon's *Origin of*

[x] The Hetrusci were variously denominated by the Greeks and Romans. The former called them

^{Latin Language.} of Ancient Nations, &c. Whether the old Celtic differed essentially from the Pelasgic and Hetruscan, would be a matter of curious investigation, were this a proper subject for the present article.

The Latin abounds with oriental words, especially Hebrew, Chaldaic, and Persian. These are certainly remains of the Pelasgic and Hetruscan tongues, spoken originally by people who emigrated from regions where those were parts of the vernacular language.—The Greeks, in polishing their language, gradually distorted and disfigured vast numbers of the rough eastern vocables, which made a very great part of it. (See the preceding section).

^{Glossary.} The Romans, of less delicate organs, left them in their natural state, and their natural air readily bewrays their original. We had collected a large list of Latin words still current in the east; but find that Thomassin † and Ogerius (x), and especially Mons. Gebelin, in his most excellent Latin Dictionary, have rendered that labour superfluous.

In this language, too, there are not a few Gothic terms. How these found their way into the Latin, it is not easy to discover, unless, as Pelloutier supposes, the Celtic and Gothic languages were originally the same: or perhaps we may conjecture, that such words were parts of a primitive language, which was at one time universal.

¹⁸²
How far
the Latin
resembles
the Greek.

There are, besides, in the Latin a great number of obsolete Greek words, which were in process of time obliterated, and others substituted in their room; so that, upon the whole, we are persuaded, that the most effectual method to distinguish the difference between the early and modern Greek, would be to compare the ancient Latin with the latter; there being, we imagine, very little difference between the ancient Greek and Latin in the earliest periods.

However that may be, it is certain that the Roman letters were the same with the ancient Greek.—*Formæ literis Latinis quæ veterrimis Græcorum*, says Tacitus*; and Pliny † says the same thing, and for the truth of his assertion he appeals to a monument extant in his own times.

^{Tacitus, Anal. lib. ii. † Nat. Hist. lib. vii. cap. 58.}

These old Greek letters were no other than the Pelasgic, which we have shown from Diodorus Siculus (see preceding Section) to have been prior to the Cadmean. For the figure of these letters, see Astle, Postellus, Montfaucon, Palægraphia Græca, Mons. Gebelin, and our Plates IX and X.

That the Latins borrowed the plan of their declensions from the Greeks, is evident from the exact resemblance of the terminations of the cases throughout the three similar declensions. In nouns of the first declension, the resemblance is too palpable to stand in need of illustration. In the second, the Greek ge-

^{Latin Language.} nitive is *oi*. In Latin the *o* is thrown out, and the termination becomes *i*. In the Greek section, we have observed, that the sounds of *i* and *u* differed very little; therefore the Latins used *i*, instead of *u*. The Latin dative ends in *o*, which is the Greek dative, throwing away *i subscriptum*, which was but faintly founded in that language. No genuine Greek word ended in *u* or *m*.

The Hellens seemed to have abhorred that bellowing liquid; it is, however, certain that they imported it from the east, as well as the other letters, and that they employed it in every other capacity, except in that of closing words. In the termination of flexions, they changed it into *v*.

The Latins retained *m*, which had been imported to them as a terminating letter at an era before the Greek language had undergone its last refinement.—Hence the Latin accusative in *um*, instead of the Greek *ov*. The vocative case, we imagine, was in this declension originally like the nominative. The Latins have no dual number, because, in our opinion, the Æolian dialect, from which they copied, had none. It would be, we think, a violent stretch of etymological exertion, to derive either the Latin genitive plural of the second declension from the same case of the Greek, or that of the latter from the former; we therefore leave this anomaly, without pretending to account for its original formation. The third declensions in both languages are so exactly parallel, that it would be superfluous to compare them. The dative plural here is another anomaly, and we think a very disagreeable one, which we leave to the conjectures of more profound etymologists.

For the other peculiarities of Latin nouns, as they are nearly similar to those of the Greek, we must beg leave to remit our readers to that section for information.

¹⁸³
The Latins have no articles, which is certainly a defect in their language. The Pelasgic, from which they copied, had not adopted that word in the demonstrative sense. Homer indeed seldom uses it; and the probability is, that the more early Greek used it less frequently, at least in the sense above-mentioned. Thus in Latin, when I say, *video hominem*, it is impossible to find out by the bare words whether the word *hominem* intimates “a man,” or “the man;” whereas in Greek it would be *βλεπω άνθρωπον*, *I see a man*, *βλεπω τον ανθρωπον*, *I see the man*. Hence the first expression is indefinite, and the second definite.

¹⁸⁴
The substantive verb *sum* in Latin seems to be partly formed from the Greek and partly not. Some of the persons of the present tense have a near resemblance to the Greek verb *ειμι* or *ειμι*, while others vary widely from that archetype. The imperfect præterite and

τυρσηνοι; which was their true name, for they actually emigrated from Tarshish, or the western coast of Asia Minor, and consequently Herodotus everywhere calls them *τυρσηνοι*. The Æolians changed *α* into *υ*; hence in that dialect they were called *τυρσηνοι*, from *Tarfus*. The Romans styled them *Tusci*, probably from the Greek verb *θυω*, *sacrifico*, alluding to the skill which that people professed in the ceremonies of religion. They called their country *Hetruria*, we think from the Chaldaic word *heretum*, “a magician or sorcerer;” a name deduced from their skill in divination.

(y) *Græca et Latina lingua Hebraizantes*, Venice 1763. If these books are not at hand, Dr Littleton's Dictionary will, in a good measure, supply their place.

Latin and præterperfect have nothing common with the Greek verb, and cannot, we think, be forced into an alliance with it. The future *ero* was of old *eso*, and is indeed genuine Greek. Upon the whole, in our apprehension the Latin substantive verb more nearly resembles the Persian verb *hesten* than that of any other language we are acquainted with.

185 And of other verbs. From what exemplar the Latin verbs were derived, is not, we think, easily ascertained. We know that attempts have been made to deduce them all from the Æolic Greek, and that the Romans themselves were extremely fond of this chimera; but the almost numberless irregularities, both in the formation and conjugation of their verbs, induce us to believe that only a part of them were formed upon that model. We are apt to think that the terminations in *bam*, *bas*, *bat*, *bamus*, &c. are produced by their union with a fragment of some obsolete verb, which is now wholly lost. In the verb *amo*, e. g. we are sure that the radix *am* is the Hebrew word *mother*; but how *am-abam*, *am-abo*, *am-arem* were fabricated, and connected with the radical *am*, is not so easily determined. That Latin verbs are composed of an inflexible radix and another flexible verb, as well as the Greek, cannot be doubted; but what this flexible auxiliary was, we think, cannot now be clearly ascertained. It is not altogether improbable that such parts of the verbs as deviate from the Greek archetype were supplied by fragments of the verb *ba*, which pervades all the branches of the Gothic language, and has, we think, produced the Latin verb *habeo*. When the Greeks began to etymologize, they seldom overpassed the verge of their own language: the Latins pursued nearly the same course. If their own language presented a plausible etymology, they embraced it; if not, they immediately had recourse to the Greek; and this was the *ne plus ultra* of their etymological researches. Cicero, Quintilian, Festus, &c. and even Varro, the most learned of all the Romans, stop here; all beyond is either doubt or impenetrable darkness. The opinion above-mentioned we offer only as a conjecture; the decision we leave to more able critics.

186 Deficiencies in Latin verbs. The want of aorists or indefinite tenses seems to us a palpable defect in the Latin language. The use of these among the Greeks enabled the writer to express the specific variations of time with more accuracy and precision than the Latins, who never attempted to specify them by any other tenses but the imperfect and pluperfect. Indeed we should imagine, that both the Greeks and Latins were much inferior to the English in this respect. The Latin word *lego*, for example, may be translated into English three different ways: 1st, *I read*; 2d, *I do read*; 3d, *I am reading*.

187 Irregularities in the conjugations. The Latins, in reducing verbs to their four conjugations, formed their inflexions in a very irregular manner. Many verbs of the first class inflect their præterite and supine like those of the second: thus *domo*, instead of giving *avi* and *atum*, has *ui* and *itum*, like *monui* and *monitum*. Again, not a few verbs of the third conjugation have *ivi* and *itum*, as if they belonged to the fourth; e. g. *peto*, *petivi*, *petitum*. Then, some verbs have *io* in the present, *ivi* in the præterite, and *itum* in the supine, while, contrary to the rules of analogy, they in reality belong to the third: such are *cupio*, *cupivi*, *cupitum*, *cupere*, &c. Some verbs of the

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second conjugation have their præterite and supine as if they belonged to the third; thus, *jubeo*, *jussi*, *jussum*, *jubere*; *augeo*, *auxi*, *auxum*, *augere*. Some verbs, which are actually of the fourth conjugation, have their præterite and supine as if they were of the third; thus *sentio*, *sensi*, *sensum*, *sentire*; *haurio*, *hausi*, *haustum*, *haurire*, &c. If these are not manifest irregularities, we cannot say what deserves the name. The fact seems to stand thus: The Romans were originally a banditti of robbers, bankrupts, runaway slaves, shepherds, husbandmen, and peasants of the most unpolished character. They were engaged in perpetual broils and quarrels at home, and seldom enjoyed repose abroad. Their profession was robbery and plunder. Like old Ishmael, their hands were against every man, and every man's hand against them. In such a state of society no time was left for cultivating the sciences. Accordingly the arts of war and government were their sole profession. This is so true, that their own poet characterizes them in the following manner:

Excudent alii spirantia mollius æra, &c.

Another blemish in the Latin tongue is occasioned by its wanting a participle of the præterite tense in the active voice. This defect is perpetually felt, and is the cause of an awkward circumlocution wherever it happens to present itself. Thus, "The general having crossed the river, drew up his army;" *Imperator, cum transisset flumen, aciem instruxit*. Here *cum transisset flumen* is a manifest circumlocution, which is at once avoided in the Greek *ὁ ἡγεμὼν περὰσας τὸν ποταμὸν*, &c. This must always prove an incumbrance in the case of active intransitive verbs. When active deponent verbs occur, it is easily avoided. Thus, "Cæsar having encouraged the soldiers, gave the signal for joining battle;" *Cæsar cohortatus milites, prælii committendi signum dedit*.

Another palpable defect in this language arises from the want of a participle of the present passive. This again must produce an inconveniency upon many occasions, as will be obvious to every Latin student almost every moment.

The two supines are universally allowed to be substantive-nouns of the fourth declension. How these assumed the nature of verbs it is not easy to determine. When they are placed after verbs or nouns, the matter is attended with no difficulty; but how they should acquire an active signification, and take the case of the verb with which they are connected, implies, we should think, a stretch of prerogative.

The Latin gerunds form another unnatural anomaly. Every Latin scholar knows that those words are nothing but the neuters of the participles of the future passive. The fabricators of the Latin tongue, however, elevated them from their primary condition, giving them upon many occasions an active signification. In this case we must have recourse to

— — — — — *Si volet usus,*
Quem penes arbitrium est et jus et norma loquendi.

Another inconveniency, perhaps more severely felt than any of the preceding, arises from the want of the use of the present participle of the verb *sum*. Every body knows what a conveniency is derived from the frequent use of the participle *ὢν* in Greek; and indeed it appears to us somewhat surprising that the

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Latins

Latin Language.

188 The Latin deficient in participles.

189 Supines and gerunds.

Latin
Language.

Latins neglected to introduce the participle *ens* into their language. In this we believe they are singular. Here again a circumlocution becomes necessary in such a case as the following: "The senate being at Rome, passed a decree." Instead of saying *senatus ens Romæ, legem tulit*, we are obliged to say *cum senatus Romæ esset*, &c. If the words *ens* or *existens* had been adopted, as in the Greek, this odious circumlocution would have been avoided.

Many other defects of the like kind will occur to every person who shall choose to search for them, and those in the most approved classical authors. Perhaps our mentioning so many may be deemed invidious by the admirers of that language; but we write from conviction, and that must be our apology.

190
Different
genius of
the Latin
and Greek
languages.

If one take the trouble to compare the structure of the Greek and Latin languages, he will, we think, quickly be convinced that their characteristic features are extremely different. The genius of the former seems easy and natural; whereas that of the latter, notwithstanding the united efforts of poets, orators, and philosophers, still bears the marks of violence and restraint. Hence it appears that the Latin tongue was pressed into the service, and compelled almost against its will to bend to the laws of the Grecian model. Take a sentence of Hebrew, Chaldean, Arabian, &c. and try to translate it into Greek without regarding the arrangement of the words, and you will find it no difficult attempt; but make the same trial with respect to the Latin, and you will probably find the labour attended with considerable difficulty. To translate Greek into English is no laborious task; the texture of the two languages is so congenial, that the words and phrases, and even the idiomatic expressions, naturally slide into each other. With the Latin the case is quite otherwise; and before elegant English can be produced, one must deviate considerably from the original. Should we attempt to translate a piece of English into Greek, and at the same time into Latin, the translation of the former would be attended with much less difficulty than that of the latter, supposing the translator equally skilled in both languages.

191
Causes of
this dif-
ference.

This incongruity seems to spring from the following cause. Before any man of considerable abilities, either in the capacity of a poet, grammarian, or rhetorician, appeared at Rome, the language had acquired a strong and inflexible tone, too stubborn to be exactly moulded according to the Grecian standard. After a language has continued several centuries without receiving a new polish, it becomes like a full grown tree, incapable of being bent to the purposes of the mechanic. For this reason, it is highly probable, that the tongue in question could not be forced into a complete assimilation with the Greek. Notwithstanding all these obstructions, in process of time it arrived at such an exalted pitch of perfection, as to rival, perhaps to excel, all the other European languages, the Greek only excepted. Had men of the taste, judgment, and industry of Ennius, Plautus, Terence, Cicero, and the worthies of the Augustan age, appeared in the early

stages of the Roman commonwealth, we may believe that their language would have been thoroughly reduced to the Grecian archetype, and that the two dialects might have improved each other by a rivalry between the nations who employed them.

Without pretending to entertain our readers with a pompous and elaborate account of the beauties of that imperial language which have been detailed by writers almost without number, we shall endeavour to lay before them as briefly as possible its pristine character, the steps and stages by which it gradually rose to perfection, the period when it arrived at the summit of its excellence, and by what means it degenerated with a rapid career till it was lost among those very people to whom it owed its birth.

We have observed already, that the Latin tongue was a *colluvies* of all the languages spoken by the va-
grant people who composed the first elements of that republic. The prevailing dialects were the Pelasgic or
Hetruscan, which we think were the same; and the Celtic, which was the aboriginal tongue of Italy. Hence the primary dialect of the Romans was composed of discordant materials, which in our opinion never acquired a natural and congenial union. Be that as it may, this motley mixture was certainly the original dialect of the Romans. The Pelasgic or Hetruscan part of it retained a strong tincture of the oriental style. The Celtic part seems to have been prevalent, since we find that most of the names of places (z), especially in the middle and northern parts of Italy, are actually of Celtic original. It is therefore clear that the style of the first Romans was composed of the languages above-mentioned. Who those first Romans were, we believe it is impossible to determine with any degree of certainty. The Roman historians afford us as little information upon that subject, as their etymologists do upon the origin of their language. Their most celebrated writers upon this point were Ælius Gallus, Quintus Cornificius, Nonius Marcellus, Festus, and some others of less note. At the head of these we ought to place Terentius Varro, whom Cicero styles the most learned of all the Romans. From these writers we are to expect no light. Their etymologies are generally childish and futile. Of the language of the most ancient Romans we can only reason by analogy; and by that rule we can discover nothing more than what we have advanced above.

In the first place we may rest assured that the dual number, the articles, the participle above-mentioned, the aorists, and the whole middle voice, never appeared in the Latin tongue; and accordingly were not current in those languages from which it was copied, at least at the time when it was first fabricated.

Besides all this, many circumstances concur to make it highly probable that, in the earliest periods of the language, very few inflexions were introduced. 1st, When the Pelasgi left Greece, the Greek language itself was not fully polished. 2d, The Arcadians were never thoroughly cultivated. They were a rustic pastoral people, and little minded the refinements of a civilized

(z) For proof of this our readers may consult Abbé Pezron, Pelloutier, Bullet's *Mem.* Gebelin *Pres.* *Dia.* *Lat.* and many others.

Latin Language. vilized state; consequently the language they brought into Italy at that era must have been of a coarse and irregular contexture. 3d, When the Thessalian* Pelasgi arrived in Italy about the time of Deucalion, the Greek itself was rude and barbarous; and, which is still of more consequence, if we may credit Herodotus quoted in the former Section, that people had never adopted the Hellenic tongue. Hence it appears, that the part of the Latin language derived from the Pelasgic or Hetruscan (for those we believe to have been the same) must have taken a deep tincture from the oriental tongues (See preceding Section). If we may judge of the Celtic of that age by that of the present, the same character must likewise have distinguished its structure.

193 Hence little inflected in its original state. From these circumstances, we think it appears that the earliest language of the Romans was very little diversified with inflexions. It nearly resembled the oriental exemplar, and consequently differed widely from the modern Latin. The effect of this was, that the modern Romans could not understand the language of their early progenitors. Polybius*, speaking of the earliest treaty between the Romans and Carthaginians, makes the following observation: "Believe me (says he), the Roman language has undergone so many changes since that time (A) to the present, that even those who are most deeply skilled in the science of antiquities cannot understand the words of that treaty but with the greatest difficulty."

From this source we make no doubt has flowed that vast number of oriental words with which the Latin language is impregnated. These were originally inflexible, like their brethren of the east. They were not disguised as they now are with prefixes, affixes, metatheses, syncopas, antitheses, &c. but plain and adorned in their natural dress.

194 Bent afterwards into the Grecian model. After the Romans became acquainted with the Æolian Greeks, who gradually seized upon both coasts of Italy towards the south, which they called *Magna Græcia*, they began to affect a Grecian air, and to torture their language into that foreign contexture. It appears, however, that at first the Grecian garb sat rather awkwardly, and several marks of violence were easily discerned. The most ancient specimen of this kind that we can recollect consists of the remains of the *twelve tables*. Here every thing is rude and of a clumsy cast; for though by this time considerable progress had been made in refinement, and the language of Rome had begun to appear in a Grecian uniform, still those changes were not altogether natural. Soon after appeared Marcus Fabius Pictor and Sisenna; historians often quoted by Livy, but whose works are long since irrecoverably lost. The *Fasti Capitolini* are often mentioned; but they too perished in the burning of the Capitol during the civil wars between Marius and Sylla. Had those monuments escaped the ravages of time, we should have been able to mark the progress of the Latin tongue from stage to stage, and to ascertain with the greatest accuracy its gradual configuration in the course of its progress towards the Grecian

standard. We must therefore leave the Latin tongue during those periods rude and barbarous, and descend to others better known and more characteristically marked. Those commenced after that

Græcia capta ferum victorem cepit et artes Intulit agresti Latio.

195 In this period we find Ennius, who wrote a Roman The principal authors by whom it was gradually polished. history in hexameter verse in 18 books, which he called *Annals*; most part of which is now lost. He likewise translated *Euhemerus de Origine Deorum*; a work often mentioned by the Christian fathers in their disputes with the Pagans. It is sometimes quoted by Cicero. Then followed Caius Lucilius the famous satyrist, and a number of other writers, such as Accius, Valerius, Æditiuus, Alpinus, &c. whose fragments were published by the Stephens, Paris, 1564. All these imitated the writers of Greece or translated from them. By their perseverance and active exertions the spirit of these authors was transfused into the Latin tongue, and its structure accommodated to the Grecian plan.

Plautus and Terence, by translating the comedies of Menander and Diphilus into their own language, taught the Latin muses to speak Attic Greek. To speak that language was then the *ton* of the times, as it is now with us to chatter French. Greek tutors were retained in every reputable family; and many Romans of the first rank were equally qualified to speak or write both in Greek and Latin. The original jargon of Latium was now become obsolete and unintelligible; and Cato the Ancient condescended to learn the Greek language at 80.

196 To pretend to enumerate the various, and we may add inimitable, examples of the Augustan or golden age of the Roman tongue, would be an insult to the understanding of our readers: we shall only take the liberty to translate a few lines from a most excellent historian*, who, had his honesty been equal to his judgment, might have rivaled the most celebrated writers of his country. Having observed, that the Greek authors, who excelled in every province of literature, had all made their appearance nearly about the same space of time, confined within very narrow limits, he adds, "Nor was this circumstance more conspicuous among the Greeks than among the Romans; for unless we go back to the rough and unpolished times, which deserve commendation only on account of their invention, the Roman tragedy is confined to Accius and the period when he flourished. The charming wit of Latin elegance was brought to light by Cecilius, Terentius, and Afranius, nearly in the same age. As for our historians (to add Livy also to the age of the former), if we except Cato and some old obscure ones, they were all confined to a period of 80 years; so neither has our stock of poets extended to a space much backward or forward. But the energy of the bar, and the finished beauty of prose eloquence, setting aside the same Cato (by leave of P. Crassus, Scipio, Lælius, the Gracchi, Fannius, and Ser. Galba, be it spoken), broke out all at once under Tully the prince of his

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(A) This treaty, according to the same historian, was concluded in the consulship of Lucius Junius Brutus and Marcus Valerius, 28 years before Xerxes made his descent upon Greece.

Latin
Language.

his profession; so that one can be delighted with none before him, and admire none except such as have either seen or were seen by that orator."

197
Causes of
the dege-
neracy of
the Latin
tongue.

From this quotation it plainly appears, that the Romans themselves were convinced of the short duration of the golden age of their language. According to the most judicious critics, it commenced with the era of Cicero's oratorical productions, and terminated with the reign of Tiberius, or perhaps it did not reach beyond the middle of that prince's reign. It is generally believed that eloquence, and with it every thing liberal, elevated, and manly, was banished Rome by the despotism of the Cæsars. We imagine that the transition was too instantaneous to have been entirely produced by that unhappy cause. Despotism was firmly established among the Romans about the middle of the reign of Augustus; and yet that period produced such a group of learned men as never adorned any other nation in so short a space of time. Despotism, we acknowledge, might have affected the eloquence of the bar; the noble and important objects which had animated the republican orators being now no more: but this circumstance could not affect poetry, history, philosophy, &c. The style employed upon these subjects did not feel the fetters of despotism. The age of Louis XIV. was the golden period of the French tongue; and we think that age produced a race of learned men, in every department superior in number and equal in genius to the literati who flourished under the noble and envied constitution of Britain during the same age, though the latter is universally allowed to have been the golden period of this country. The British isles, we hope, enjoy still as much liberty as ever; yet we believe few people will aver, that the writers of the present age are equal either in style or in genius to that noble group who flourished from the middle of the reign of Charles I. to the middle of the reign of George II. and here despotism is quite unconcerned.

In the east the same observation is confirmed. The Persians have long groaned under the Mohammedan yoke; and yet every oriental scholar will allow, that in that country, and under the most galling tyranny, the most amazing productions of taste, genius, and industry, that ever dignified human nature, have been exhibited. Under the Arabian caliphs, the successors of Mohammed, appeared writers of a most sublime genius, though never was despotism more cruelly exercised than under those fanatics. The revival of letters at the era of the reformation was chiefly promoted and cherished by petty despotical princes.

We cannot therefore be persuaded to agree, that the despotism of the Cæsars banished eloquence and learning from Rome. Longinus indeed has attributed this misfortune to that cause, and tells us, *ὅτι γὰρ ἵκανη τὰ φρονήματα τῶν Μεγαλοφρονῶν ἡ ΕΛΕΥΘΕΡΙΑ*, &c. "It is liberty that is formed to nurse the sentiments of great geniuses, to push forward the propensity of contest, to inspire them with hopes, and the generous ambition of being the first in rank." When Longinus wrote this, he did not reflect that he himself was a striking instance of the unsoundness of his observation.

As to science, the fact is undoubtedly on the other side. That Seneca was superior to Cicero in philoso-

phy, cannot be reasonably contradicted. The latter had read, and actually abridged, the whole extent of Grecian philosophy: this displayed his reading rather than his learning. The former had addicted himself to the stoic sect; and though he does not write with the same flow of eloquence as Tully, he thinks more deeply and reasons more closely. Pliny's Natural History is a wonderful collection, and contains more useful knowledge than all the writings of the Augustan age condensed into one mass. We think the historical annals of Tacitus, if inferior to Livy in style and majesty of diction, much superior in arrangement and vigour of composition. In short, we discover in these productions a deep insight into human nature, an extensive knowledge of the science of government, a penetration which no dissimulation could escape, together with a sincere attachment to truth both with respect to events and characters; nor is he inferior in the majesty, energy, and propriety of his harangues, wherever an equal opportunity presents itself. Quintilian, Pliny the younger, Suetonius, Petronius Arbiter, and Juvenal, deserve high esteem; nor are they inferior to their immediate predecessors. We think there is good reason to conclude, that the loss of liberty among the Romans did not produce the extinction of eloquence, science, elevation of sentiment, or refinement of taste. There were, we believe, other circumstances which chiefly contributed to produce that revolution.

The same Velleius Paterculus whom we have quoted assigns some plausible and very judicious reasons for this catastrophe. "Emulation (says he) is the nurse of genius; and one while envy, and another admiration, fires imitation. According to the laws of nature, that which is pursued with the greatest ardour mounts to the top: but to be stationary in perfection is a difficult matter; and by the same analogy, that which cannot go forward goes backward. As at the outset we are animated to overtake those whom we deem before us, so when we despair of being able to overtake or to pass by them, our ardour languishes together with our hope, and what it cannot overtake it ceases to pursue; and leaving the subject as already engrossed by another, it looks out for a new one upon which to exert itself. That by which we find we are not able to acquire eminence we relinquish, and try to find out some object *elsewhere* upon which to employ our intellectual powers. The consequence is, that frequent and variable transitions from subject to subject proves a very great obstacle to perfection in any profession."

This perhaps was the case with the Romans. The heroes of the Augustan age had borne away the prize of eloquence, of history, of poetry, &c. Their successors despaired of being able to equal, much less to surpass them, in any of these walks. They were therefore laid under the necessity of striking out a new path by which they might arrive at eminence. Consequently Seneca introduced the *stile coupé*, as the French call it; that is, a short, sparkling, figurative diction, abounding with antitheses, quaintnesses, witticisms, embellished with flowers and meretricious ornaments; whereas the style of the Augustan age was natural, simple, solid, unaffected, and properly adapted to the nature of the subject and the sentiments of the author.

The historian Sallust laid the foundation of the un-

Latin Language. natural style above mentioned. Notwithstanding all the excellencies of that celebrated author, he every where exhibits an affectation of antiquity, an antithetical cast, an air of austerity, an accuracy, exactness, and regularity, contrary to that *air degagé* which nature displays in her most elaborate efforts. His words, his clauses, seem to be adjusted exactly according to number, weight, and measure, without excess or defect. Velleius Paterculus imitated this writer; and, as is generally the case with imitators, succeeded best in those points where his archetype had failed most egregiously. Tacitus, however excellent in other respects, deviated from the Augustan exemplars, and is thought to have imitated Sallust; but affecting brevity to excess, he often falls into obscurity. The other contemporary writers employ a cognate style; and because they have deviated from the Augustan standard, their works are held in less estimation, and are thought to bear about them marks of degeneracy.

That degeneracy, however, did not spring from the despotic government under which these authors lived, but from that affectation of singularity into which they were led by an eager but fruitless desire of signaling themselves in their mode, as their predecessors had done in theirs. But the mischiefs of this rage for innovation did not reach their sentiments as it had done their style; for in that point we think they were so far from falling below the measure of the writers of the former age, that in many instances they seem to have surpassed them.

With respect to sentiment and mental exertions, the authors in question preserved their vigour, till luxury and effeminacy, in consequence of power and opulence, enervated both the bodies and minds of the Romans. The contagion soon became universal; and a listlessness, or intellectual torpor, the usual concomitant of luxury, spread indolence over the mental faculties, which rendered them not only averse to, but even incapable of, industry and perseverance. This lethargic disposition of mind seems to have commenced towards the conclusion of the silver age; that is, about the end of the reign of Adrian. It was then that the Roman eagles began to stoop, and the genius of Rome, as well in arts as in arms, began to decline. Once more, the declension of the intellectual powers of the writers of that nation did not arise from the form of the government, but from the causes above specified.

As the Roman genius, about that period, began to decline, so the style of the silver age was gradually vitiated with barbarisms and exotic forms of speech. The multitudes of barbarians who flocked to Rome from all parts of the empire; the ambassadors of foreign princes, and often the princes themselves, with their attendants; the prodigious numbers of slaves who were entertained in all the considerable families of the capital, and over all Italy; the frequent commerce which the Roman armies upon the frontiers carried on with the barbarians; all concurred to vitiate the Latin tongue, and to interlard it with foreign words and idioms. In such circumstances, it was impossible for that or any other language to have continued pure and untainted.

This vitiated character both of style and sentiment became more and more prevalent, in proportion as it descended from the reign of Adrian towards the era

of the removal of the imperial seat from Rome to Constantinople. Then succeeded the iron age, when the Roman language became absolutely rude and barbarous.

199 Towards the close of the silver, and during the whole course of the brazen age, there appeared, however, many writers of no contemptible talents. The most remarkable was Seneca the stoic, the master of Nero, whose character both as a man and a writer is discussed with great accuracy by the noble author of the *Characteristics*, to whom we refer our readers.

About the same time lived Persius the satyrist, the friend and disciple of the stoic Cornutus; to whose precepts, as he did honour by his virtuous life, so his works, though small, show an early proficiency in the science of morals.

Under the mild government of Adrian and the Antonines lived Aulus Gellius, or (as some call him) Agellius; an entertaining writer in the miscellaneous way, well skilled in criticism and antiquity. His works contain several valuable fragments of philosophy, which are indeed the most curious part of them.

With Aulus Gellius we may range Macrobius; not because a contemporary (for he is supposed to have lived under Honorius and Theodosius), but from his near resemblance in the character of a writer. His works, like those of the other, are miscellaneous; filled with mythology and ancient literature, with some philosophy intermixed.

In the same age with Aulus Gellius flourished Apuleius of Madaura in Africa; a Platonic writer, whose matter in general far exceeds his perplexed and affected style, too conformable to the false rhetoric of the age when he lived.

Boethius was descended from one of the noblest of the Roman families, and was consul in the beginning of the sixth century. He wrote many philosophical works; but his ethic piece on the Consolation of Philosophy deserves great encomiums, both for the matter and the style; in which latter he approaches the purity of a far better age than his own. By command of Theodoric king of the Goths this great and good man suffered death; with whom the Latin tongue, and the last remains of the Roman dignity, may be said to have sunk in the western world.

There were besides a goodly number both of poets and historians who flourished during this period; such as Silius Italicus, Claudian, Ausonius, &c. poets and historians to a very great number, for whom our readers may consult *Joh. Alberti Fabricii Bibl. Lat.*

There flourished, too, a number of ecclesiastical writers, some of whom deserve great commendation. The chief of these is Lactantius, who has been deservedly dignified with the title of the *Christian Cicero*.

The Roman authors amount to a very small number in comparison of the Greek. At the same time, when we consider the extent and duration of the Roman empire, we are justly surprised to find so few writers of character and reputation in so vast a field. We think we have good reason to agree with the prince of Roman poets in the sentiment quoted p. 563.

Upon the whole, the Latin tongue deserves our attention beyond any other ancient one now extant. The grandeur of the people by whom it was spoken; the

Latin Language.

199 Writers of great talents during the silver and brazen ages.

200 Elegant ecclesiastical writers in Latin.

Celtic
Language.
201
Excellency
and useful-
ness of the
Latin
tongue.

the lustre of its writers; the empire which it still maintains among ourselves; the necessity we are under of learning it in order to obtain access to almost all the sciences, nay even to the knowledge of our own laws, of our judicial proceedings, of our charters; all these circumstances, and many others too numerous to be detailed, render the acquisition of that imperial language in a peculiar manner at once improving and highly interesting. Spoken by the conquerors of the ancient nations, it partakes of all their revolutions, and bears continually their impression. Strong and nervous while they were employed in nothing but battles and carnage, it thundered in the camps, and made the proudest people to tremble, and the most despotic monarchs to bend their stubborn necks to the yoke. Copious and majestic, when, weary of battles, the Romans inclined to vie with the Greeks in science and the graces, it became the learned language of Europe, and by its lustre made the jargon of savages disappear who disputed with it the possession of that quarter of the globe. After having controlled by its eloquence, and humanized by its laws, all those people, it became the language of religion. In short, the Latin language will be studied and esteemed as long as good sense and fine taste remain in the world.

SECT. IX. Celtic, Gothic, and Sclavonian Languages.

§ 1. Of the Celtic Language.

IN treating of the origin of the Latin tongue (see Section VIII.), we observed that a great part of it is derived from the Celtic. We shall now endeavour to give some account of the origin and extent of that ancient language; still leaving the *minutiae* to grammars and dictionaries, as we have done with respect to the other dialects which have fallen under our consideration. Our candid readers, it is hoped, will remember, that we are acting in the character of philologists, not in that of grammarians and lexicographers.

202
Origin of
the Celts,

The descendants of Japhet having peopled the western parts of Asia, at length entered Europe. Some broke into that quarter of the globe by the north, others found means to cross the Danube near its mouth. Their posterity gradually ascended towards the source of that river; afterwards they advanced to the banks of the Rhine, which they passed, and thence spread themselves as far as the Alps and the Pyrenean hills.

These people, in all probability, were composed of different families; all, however, spoke the same language; their manners and customs bore a near resemblance; there was no variety among them but that difference which climate always introduces. Accordingly they were all known, in the more early times, by the general name of *Celto-scythæ*. In process of time, becoming exceedingly numerous, they were divided into several nations, which were distinguished by different names and territorial appellations. These who inhabited that large country bounded by the ocean, the Mediterranean, the Rhine, the Alps, and the Pyrenees, were denominated *Gauls* or *Celts*. Those people multiplied so prodigiously in the space of a few centuries, that the fertile regions which they then occupied could not afford them the means of subsistence. Some of them now passed over into Britain; others

203
Part of
whom were
denomina-
ted Gauls.

crossed the Pyrenees, and formed settlements in the northern parts of Spain. Even the formidable barriers of the Alps could not impede the progress of the Gauls: they made their way into Italy, and colonized those parts which lie at the foot of the mountains; whence they extended themselves towards the centre of that rich country.

By this time the Greeks had landed on the eastern coast of Italy, and founded numerous colonies in those parts. The two nations vying as it were with each other in populousness, and always planting colonies in the course of their progress, at length encountered about the middle of the country. This central region was at that time called *Latium*. Here the two nations formed one society, which was called the *Latin people*. The languages of the two nations were blended together; and hence, according to some, the Latin is a mixture of Greek and Gaelic.

As the Gauls were a brave and numerous people, they certainly maintained themselves in their pristine possessions, uninvaded, unconquered, till their civil animosities and domestic quarrels exposed them as a prey to those very Romans whom they had so often defeated, and sometimes driven to the brink of destruction. They were not a people addicted to commerce; and, upon the whole, considering their situation both in their primary seats and afterwards in Italy, they had little temptation or opportunity to mingle with foreigners. Their language, therefore, must have remained unmixed with foreign idioms. Such as it was when they settled in Gaul, such it must have continued till the Roman conquests. If therefore there is one primitive language now existing, it must be found in the remains of the Gaelic or Celtic. It is not, then, surprising, that some very learned men, upon discovering the coincidence of very great numbers of words in some of the Greek dialects with other words in the Celtic, have been inclined to establish a strict affinity between those languages. The ancient Pelasgic and the Celtic at least must have nearly resembled each other, admitting a dialectical difference only, and that discrimination which climate and a long period of time must always produce.

204
Resem-
blance be-
tween their
language
and that
of the Pe-
lasgi.

Some have thought that the Gauls lost the use of their native language soon after their country was conquered by the Romans; but *Monsieur Bullet*, in his *Memoires de la Langue Celtique*, has proved almost to a demonstration, that the vulgar among those people continued to speak it several centuries after that period. When a great and populous nation has for many ages employed a vernacular tongue, nothing can ever make them entirely relinquish the use of it, and adopt unmixed that of their conquerors.

Many learned men, among whom is the lexicographer above-mentioned, have shown that all the local names in the north of Italy are actually of Celtic extraction. These names generally point out or describe some circumstances relating to the nature of their situation; such as exposure, eminence, lowness, moistness, dryness, coldness, heat, &c. This is a very characteristic feature of an original language; and in the Celtic it is so prominent, that the Erse names of places all over Scotland are, even to this day, peculiarly distinguished by this quality. We have heard a gentleman, who was well skilled in the dialect of the Celtic still spoken

Celtic Language. in the Highlands of Scotland, propose to lay a bet, at very great odds, that if one should pronounce the name of any village, mountain, river, gentleman's seat, &c. in the old Scottish dialect, he should be able, by its very name, to give a pretty exact description of its local situation.

To discover the sources from which the Celtic tongue is derived, we must have recourse to the following expedients.

1. We must consult the Greek and Latin authors, who have preserved some Gaelic or Celtic terms in their writings.

2. We must have recourse to the Welsh and *Basse Bretagne* dialects; in which, indeed, there are many new words, but these are easily distinguished from the primitive stock.

3. If one would trace another source of the Celtic, he must converse with the country people and peasants, who live at a distance from cities, in those countries where it was once the vernacular tongue. We have been credibly informed, that a Highland gentleman, crossing the Alps for Italy, accidentally fell in with an old woman, a native of those parts, who spoke a language so near akin to his native Erse, that he could understand her with little difficulty; and that she, on the other hand, understood most of his words. That an event of this nature should actually take place is by no means surprising, when we consider that the Erse spoken in the Highlands of Scotland is perhaps the most genuine remnant of the Celtic now existing, and at the same time reflect that there may be some remote cantons among those wild and inaccessible mountains, the Alps, where some remains of that tongue may be still preserved.

205 The most genuine remains of the Celtic in the Highlands of Scotland. 4. We have said, that the most genuine remains of the Gaelic tongue are to be found in the Highlands of Scotland; and the reason is obvious. The Scottish Highlanders are the unmixed unconquered posterity of the ancient Britons, into whose barren domains the Romans never penetrated; not, we imagine, because they were not able, since they subdued both North and South Wales, equally inaccessible, but because they found no scenes there either to fire their ambition or allure their avarice. Amidst all the revolutions that from time to time shook and convulsed Albion, those mountainous regions were left to their primitive lords, who, like their southern progenitors, hospitable in the extreme, did not, however, suffer strangers to reside long among them. Their language, accordingly, remained unmixed, and continues so even to this day, especially in the most remote parts and unfrequented islands.

The Norwegians subdued the western islands of Scotland at a time when the Scottish monarchy was still in its minority. They erected a kind of principality over them, of which the isle of *Man* was the capital. Though they maintained the sovereignty of those islands for some centuries, built many forts, and strengthened them with garrisons, and in fine were the lawgivers and administrators of justice among the natives; yet we have been informed by the most respectable authority, that there is not at this day a single vocable of the Norse or Danish tongue to be found among those islanders. This fact affords a demonstration of that superstitious attachment with which they were devoted to their vernacular dialects.

The Welsh dialect cannot we think be pure and unsophisticated. The *Silures* were conquered by the Romans, to whom they were actually subject for the space of three centuries. During this period, a multitude of Italian exotics must have been transplanted into their language; and indeed many of them are discernible at this day. Their long commerce with their English neighbours and conquerors hath adulterated their language, so that a great part of it is now of an English complexion. The Irish is now spoken by a race of people whose morality and ingenuity are nearly upon a level. Their latest historians have brought them from the confines of Asia, through a variety of adventures, to people an island *extra anni solisque vias*. However this genealogical tale may please the people for whom it was fabricated, we must still suspect that the Irish are of Celtic extraction, and that their forefathers emigrated from the western coast of Britain at a period prior to all historical or even traditional annals. Ireland was once the *native land of saints*. The chief actors on this sacred stage were Romanists, and deeply tinged with the superstition of the times. They pretended to improve the language of the natives; and whatever their success was, they improved it in such a manner as to make it deviate very considerably from the original Celtic; so that it is not in Ireland that we are to look for the genuine characters of the dialect under consideration.

Though the Hibernian tongue, in our opinion, differs considerably from the original Celtic, some very ingenious essays have been lately published by the learned and laborious members of the *Antiquarian Society of Dublin*; in which the coincidence of that tongue, with some of the oriental dialects, has been supported by very plausible arguments. In a dissertation published in the year 1772, they have exhibited a collection of *Punico-Maltese* words compared with words of the same import in Irish, where it must be allowed the resemblance is palpable. In the same dissertation they have compared the celebrated *Punic* scene in Plautus with its translation into the Irish; in which the words in the two languages are surprisingly similar. If those criticisms are well founded, they will prove that the Celtic is coeval and congenial with the most ancient languages of the east; which we think highly probable. Be that as it may, the Danes and Norwegians formed settlements in Ireland; and the English have long been sovereigns of that island. These circumstances must have affected the vernacular idiom of the natives; not to mention the necessity of adopting the language of the conquerors in law, in sciences, in the offices of religion.

The inhabitants of the highlands and islands of Scotland are the descendants of those Britons who fled from the power of the Romans, and sheltered themselves among the fens, rocks, and fastnesses of those rugged mountains and sequestered glyns. They preferred these wastes and wilds, with liberty and independence, to the pleasant and fertile valleys of the south, with plenty embittered by slavery. They no doubt carried their language along with them; that language was a branch of the Celtic. With them, no doubt, fled a number of the druidical priests, who unquestionably knew their native dialect in all its beauties and

Celtic Language.
206
The Welsh dialect not pure, nor the Irish.

207
Coincidence between the Celtic and Phœnician.

Celtic
Language.

and varieties. These fugitives in process of time formed a regular government, elected a king, and became a considerable state. They were sequestered by their situation from the rest of the world. Without commerce, without agriculture, without the mechanical arts, and without objects of ambition or emulation, they addicted themselves wholly to the pastoral life as their business, and to hunting and fishing as their diversion. Those people were not distinguished by an innovating genius; and consequently their language must have remained in the same state in which they received it from their ancestors. They received it genuine *Celtic*, and such they preserved it.

When the Scots became masters of the low country, and their kings and a great part of the nobility embraced the Saxon manners, and adopted the Saxon language, the genuine Caledonians tenaciously retained their native tongue, dress, manners, clanships, and feudal customs, and could never cordially assimilate with their southern neighbours. Their language, therefore, could not be polluted with words or idioms borrowed from a people whom they hated and despised. Indeed it is plain from the whole tenor of the Scottish history, that neither Caledonian chieftains, nor their vassals, were ever steadily attached to the royal family after they fixed their residence in the low country, and became *Saxons*, as the Highlanders called them by way of reproach. Indeed the commerce between them and those of the south, till about a century and a half ago, was only transient and accidental; nor was their native dialect in the least affected by it.

208
Causes of
the purity
of the
Scotch dia-
lect of this
ancient lan-
guage.

Their language, however, did not degenerate, because there existed among them a description of men whose profession obliged them to guard against that misfortune. Every chieftain retained in his family a bard or poet laureat, whose province it was to compose poems in honour of his lord, to commemorate the glorious exploits of his ancestors, to record the genealogy and connections of the family; in a word, to amuse and entertain the chief and his guests at all public entertainments and upon all solemn occasions. Those professors of the Parnassian art used to vie with each other; and the chiefs of families often assembled their respective bards, and encouraged them by considerable premiums to exert their poetic talents. The victor was rewarded and honoured; and the chieftain deemed it an honour to himself to entertain a bard who excelled his peers. The ancient Gauls, as we learn from Diodorus Siculus, Strabo, Tacitus, Lucan, &c. entertained persons of that profession; and certainly the ancient Britons did the same. Those bards were highly revered; their persons were deemed sacred; and they were always rewarded with salaries in lands or cattle (See section *Greek*.) Those poetic geniuses must have watched over their vernacular dialect with the greatest care and anxiety; because in their compositions no word was to be lost, but as many gained as possible.

The use of letters was not known among the ancient *Celts*; their druidical clergy forbade the use of them. All their religious rites, their philosophical dogmas, their moral precepts, and their political maxims, were composed in verses which their pupils were obliged to commit to memory. Accordingly letters

were unknown to the Caledonian Scots, till they learned them either from their southern neighbours or from the Romans. The Irish, indeed, pretend to have letters of a very ancient date; the Highlanders of the country in question make no claim to the use of that invention. Their bards, therefore, committed every thing to memory; and of course the words of their language must have been faithfully preserved. We find that the celebrated poems of Ossian, and others of an inferior character, or at least fragments of such poems (see *Ossian*), have thus been preserved from father to son for more than 1000 years. The beauty, significancy, harmony, variety, and energy of these verses, strike us even in a prose translation: how infinitely more charming must they appear in their native form and poetical attire!

In order to exhibit the genius of the Celtic in as striking a light as the nature of our present design will permit, we shall lay before our readers a very contracted sketch of the Gaelic or Caledonian dialect as it now stands; which we hope will go a great way to convince them that this is the genuine offspring of the other. In doing this we shall borrow many hints from a gentleman * whose learning seems to equal his zeal for his native language; which, in compliance with the modern practice, we shall for the future distinguish by the name of *Gaelic*.

* *Essays*,
&c. by
James
Grant,
Esq; ad-
vocate.

The Gaelic is not derived from any other language as far as we know, being obviously reducible to its own roots. Its combinations are formed of simple words of a known signification; and those words are resolvable into the simplest combinations of vowels and consonants, and even into simple sounds. In such a language we may expect that some traces will be found of the ideas and notions of mankind living in a state of primeval simplicity; and if so, a monument is still preserved of the primitive manners of the Celtic race while as yet under the guidance of simple nature, without any artificial restraint or controul.

The sudden sensations of heat and cold, and bodily pain, are expressed by articulate sounds, which, however, are not used in this language to denote heat, cold, or bodily pain. A sudden sensation of heat is denoted by an articulate exclamation *hait*; of cold, by *id*; of bodily pain, by *oich*. All these sounds may be called *interjections*, being parts of speech which discover the mind to be seized with some passion. Few of the improved languages of Europe present so great a variety of sounds which instantaneously convey notice of a particular passion, bodily or mental feeling.

The pronouns *he* and *she* are expressed by the simple sounds *e* and *i*, and these are the marks of the masculine and feminine genders; for a neuter gender is unknown in the *Gaelic*. The compositions of rude and barbarous ages are universally found to approach to the style and numbers of poetry; and this too is a distinguishing character of the *Gaelic*. Bodily subsistence will always be the principal concern of an uncultivated people. Hence *ed* or *eid* is used upon discovery of any animal of prey or game: it is meant to give notice to the hunting companion to be in readiness to seize the animal: and hence we believe *edo* "to eat" in Latin, and *ed* in Irish, signifies "cattle;" likewise in Scotch *edal* "cattle," literally signifies "the

Celtic Language. "the offspring or generation of cattle." *Coed* or *cued*, "share or portion of any subject of property," literally "common food." *Fæd* "hunting," literally "gathering of food." *Edra* "the time of the morning when cattle are brought home from pasture to give milk," literally "meal-time." These are words importing the simplicity of a primitive state, and are common in the Gaelic idiom.

Traces of imitative language remain in all countries. The word used for *cow* in the Gaelic language is *bo*, plainly in imitation of the lowing of that animal.

209
Excellency
of Gaelic
compounds.

In joining together original roots in the progress of improving language and rendering it more copious, its combinations discover an admirable justness and precision of thought, which one would scarce expect to find in an uncultivated dialect. It will, however, be found, upon examination, that the Gaelic language, in its combination of words, specifies with accuracy the known qualities, and expresses with precision the nature and properties which were attributed to the object denominated.

An appears to have been a word of frequent use in this language, and seems to have been originally a name applied indefinitely to any object. According to *Bullet*, it was used to signify "a planet;" hence the *sun* had the name of *grian*, which is a compound of *gri* "hot," and *an* "a planet." *Re* signifies originally and radically "division." The changes of the moon and the variety of her phases were early employed to point out the divisions of time. The present name for the *moon* is *geulach*; a word derived from her whiteness of colour. To these we might add a vast number more whose signification precisely indicates their shape, colour, effects, &c. Many of these would be found exactly similar to Greek and Latin words of the same sound and signification. In order to satisfy our curious readers, we shall annex a few, though some of them may perhaps be questionable.

The *Venus* of the Latins is said to be a compound of *ben* and *jus*, which literally signify "the first woman," the letter *b* in Gaelic being softened into *v*. *Edag* and *idag* signify "food." These words are compounded of the Gaelic words *ed* or *eid* and *ar*; the former denotes *food* simply, and the latter *ploughed land*. These are the roots of the Greek and Latin words *ida-edo*, *agow* *aro*. *Edga*, which signifies "a seat," has an evident reference to food. It is compounded of two Gaelic words *ed* and *ira*, which literally signify "meal-time." *Edva*, which signifies "the presents which a bridegroom made to his bride," is a compound of two Gaelic words *ed* and *na* or *nuab*, literally signifying "raw food." From *ar* there are many Greek derivatives. *Aguræ* signifies "ploughed land," also "crop of corn;" *Aptos* "bread." In Gaelic a *crop of corn and bread* are expressed by *arbhar*, commonly pronounced *arar* and *aran*; all being equally derivatives of the root *ar*. So the Greek and Latin words *apotos*, *arabilis*, "arable;" *apotrop*, *aratrum*, "a plough;" *apotræ*, *arator*, "a ploughman;" and many others, are evidently derived from the same source. We would not, however, suggest, in consequence of this coincidence, that either the Greek or Latin lan-

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guages were derived from the Gaelic; we rather believe that these are remains of a primeval tongue, which are still retained in all the three; and we produce them upon the present occasion as presumptions that the Gaelic is an original, underived language, and of course the most pure and unadulterated relick of the Celtic now existing. If our readers should incline to know more of this subject, they may consult *Pezron's Origin of Ancient Nations*, *Bullet's Mem. de la Langue Celtique*, *Parson's Rem. of Japhet*, *Gebelin, Monde prim.* &c.

When the Celtic language was generally spoken over Europe, it seems to have been amazingly copious. By consulting *Bullet's Memoires*, it appears that its names for the common and various objects of nature were very numerous. The words denoting water, river, wood, forest, mountain, lake, &c. were most precisely accommodated to specify each modification and variety, with such peculiar exactness as even the Greek, with all its boasted idiomatical precision and copiousness, has not been able to equal. The appearances which diversify the visible face of inanimate nature, arrest the attention of men in an uncultivated state. Unaccustomed to thought and abstract reasoning, their minds expand and exercise their powers upon sensible objects, and of course mark every *minutia* and almost imperceptible distinction with an accuracy to us seemingly impossible.

We hope it now appears to every reader, that the Celtic was one of the dialects of the primitive language; that it once overspread by far the greatest part of Europe; that the Gaelic now spoken in the northern parts of Scotland and the adjacent islands is the most pure and unmixed relick of that tongue now anywhere existing. We would willingly refer our readers to some well composed grammar of that language; but indeed we know of none that deserves our recommendation. Some years ago we were flattered with the prospect of seeing one published by a gentleman whose deep skill in that language is universally acknowledged. We have likewise heard of an intended dictionary of the same tongue; but hitherto our hopes have been disappointed.

We are, however, happy to find that there is now publishing an excellent translation of both the Old and New Testaments into Gaelic, which has hitherto been a desideratum among those who speak this language. Such a translation will at once contribute to preserve that ancient tongue, and disseminate the knowledge of the truth among the natives of that country.

Every assistance towards acquiring the knowledge of a tongue which was once universal over a great part of Europe, will certainly be an acceptable present to the public. The antiquary, who is desirous of tracing the affinity of languages, and wishes to mark the migrations of people, ought certainly to apply himself to the study of its remaining branches; and, if we mistake not, he will soon be convinced, that they all breathe a spirit congenial to the manners and sentiments of a people who are just entering upon the first stage of improvement and civilization.

Perhaps it may be expected, that, before we conclude this short sketch of the Celtic tongue, we should

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give some account of the origin of the words *Gaul* and *Gal*, the two names by which this people was distinguished by the Greeks and Romans. Mr M'Pherson imagines, that the appellation of *Celt* is an adjective derived from *Gael*, the aboriginal name of the inhabitants of ancient Gaul. For our part, we can see no connection between *Gael* and *Kelt*, nor do we think that the latter is an adjective. We believe that those people called themselves *Cael* and not *Gael*. We are sure that *Caledonia*, or *Cal-don* or *dun*, was an ancient name of the mountainous parts of Scotland.

Though many different opinions have been advanced with relation to the etymology of this word, we imagine that none is so probable as that which supposes that it is compounded of the two Celtic words *Cal* or *Kal*, that is, "Gal or Gaul," and *dun*, which signifies "a hill or mountain." Upon this ground, the Caledonii will import the Gauls of the mountains, or, which is the same, the Highland Gauls. The Irish and Highlanders reciprocally denominate themselves by the general title of *Cael*, *Gael*, or *Gauls*. They also distinguish themselves, as the Welch originally did, and as the Welch distinguish them both at present, by the appellation of *Guidhill*, *Guethel*, and *Gathel*. The intermediate *th*, they say, is left quiescent in the pronunciation, as it is in many words of the British language; in which case *Gathel* would immediately be formed into *Gael*; and *Gathel* is actually sounded like *Gael* by both the Irish and Highlanders at present. The appellation of *Gathel*, therefore, say they, was originally the same with *Gael*, and the parent of it. The quiescent letters in British are frequently transferred from the middle to the conclusion of the word; by which manœuvre, *Gathel* is changed into *Galath*, *Galat*, *Galt*, and *Celt*. It is true, that *Gael* of the continent is universally denominated *Galata* and *Celta* by the Grecians, and *Galli* and *Gallia* by the Irish. The appellations, therefore, of *Gathel-i*, *Gall-i*, *Gallat-a*, *Calet-es*, *An-calit-es*, and *Celt-a*, are all one and the same denomination, only varied by the astonishing ductility of the Celtic, and disguised by the alterations ever incident to a language that has been merely oral for ages.

It may perhaps appear presumptuous in us to differ from two such respectable authorities as M'Pherson and Whitaker: we must, however, acknowledge, that neither the one nor the other appears to us well founded. Besides, they convey no idea of the signification of the words, though in the Celtic language they must have been significant. The name *Cael*, the same with *Gal*, was probably given them in the East from the Greek *καλ*, which in many oriental languages denotes *fair*; and *καλατι* may be easily derived from *καλ* or *καλαθ*, *Gal* or *Galath*.—This denomination might be given them by their neighbours, in allusion to their fair complexion.

§ 2. Of the Gothic Language.

THE Celtic and Gothic tongues at one time divided

Europe between them. Both were of equal antiquity, both originated in Asia, both were dialects of the original language of mankind. The Celtic, however, was first imported into Europe. The Gauls or Celts had penetrated farthest towards the west; a circumstance which plainly intimates the priority of their arrival. In the population of countries, we believe it may be held as a maxim, that the colonies who emigrated first were generally impelled by succeeding emigrants; and that of consequence the most early were pushed forward to the parts most distant. The Celts, then, having overspread the most western parts of Europe, must have arrived more early in those regions.

The Goths and Getæ were the same race of people, according to Procopius*, *de bello Goth.*; and Strabo† (B) informs us, that they spoke the same language with the Thracians, from whose confines they had spread themselves northward as far as the western banks of the Danube. Vopiscus, in the History of Probus, tells us, that this emperor‡ obliged "the Thracians, and all the Getic tribes, either to surrender or accept of his friendship." This expression indicates, that the Thracians and the Getic tribes were deemed the same race of people. From this deduction it is clear, that the Getæ and Thracians were brethren; that they spoke the same language; and that their laws, manners, customs, and religious tenets, were the same, might easily be shown, were this a proper place for an inquiry of that nature.

The Thracian language, as might be demonstrated from names of persons, offices, places, and customs, among that people, was nearly related to the Chaldean and other oriental languages.

They are thought to have been the descendants of Tiras, one of the sons of Japhet, and consequently must have preserved the speech of the Noachic family. The Gothic language abounds with *Pahlavi*, or old Persian words, which are no doubt remains of the primeval dialect of mankind. The Thracians peopled a considerable part of the northern coast of Asia Minor; and consequently we meet with many names of cities, mountains, rivers, &c. in those parts, exactly corresponding with many names in Europe, evidently imposed by our Gothic progenitors. Any person tolerably acquainted with the remains of the Gothic tongue, will be able to trace these with little difficulty.

We learn from Herodotus||, that Darius in his expedition against the wandering Scythians who lived on the other side of the Ister or Danube, in his progress subdued the Getæ; and in the same passage the historian informs us, that these people held the immortality of the human soul, and that they were the bravest and most just of all the Thracians. After this period, we find them mentioned by almost every Greek writer, even familiarly; for Getæ in the comedies of that nation, is a common name for a slave. The Getæ then occupied all that large tract of country

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Ancient
Gothic.* Lib. i.
cap. 2.
† Lib. ii.
cap. 23.
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The same
with the
language
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Thracians.
† Lib. 7.214
Origin of
the Goths.|| Lib. 4.
p. 111.

(B) Lib. vii. page 295, B.; *ibid.* page 305. G. (Cafaubon). From this passage it appears, that the Greeks were of opinion that the Getæ were Thracians. *Plin. Nat. Hist.* l. iv. cap. 11. mentions a tribe of the Getæ called *Gauda*.

^{Gothic Language.} try which extended from the confines of Thrace to the banks of the Danube; were a brave and virtuous people; and spoke the same language with the Thracians, with whom they are often confounded both by Greek and Roman historians.

But the name of *Goths* is by no means so ancient. It was utterly unknown both to the ancient Greeks and Romans. The first time that the name *Goth* is mentioned is in the reign of the Emperor Decius, about the year of Christ 250. About that time they burst out of Getia, and rushing like a torrent into the empire, laid waste every thing with fire and sword. The name of their leader or king was *Cneva*. Decius, endeavouring to expel them Thrace, was vanquished and slain.

^{History of Norway, lib. i.} After this irruption, we find them frequently in the Latin authors under the name of *Getæ* or *Gothi*; tho' the Greeks generally denominate them *Scythæ*. Torfæus tells us, that *get* † and *got* is actually the same word, which anciently, according to him, denoted a "soldier." *Got* in Icelandic signifies a "horse or horseman," and *gata* a "wanderer;" and this last was perhaps the import of the term *Getæ*, they being originally an unsettled vagrant people. As nations generally assume to themselves some high auspicious denomination, we may believe the Goths did the same. We may therefore rest satisfied, that the *Getæ* assumed the Icelandic name above mentioned as their national one: or perhaps, notwithstanding their Greek denomination, they called themselves *Gots* or *Goths* from the beginning.

²¹⁵ ^{Their primary seat.} The original seat of the Goths was the country now called *Little Tartary*, into which they had extended themselves from the frontiers of Thrace. This country was called *Little Scythia* by the Greek writers; and it was the station whence those innumerable swarms advanced, which, in conjunction with the Alani and other barbarous tribes, at length over-ran and subverted the western empire. One part of the Gothic nation was allowed by Constantine to settle in *Mœsia*. Before the year 420 most of the Gothic nations who had settled within the limits of the Roman empire had been converted to the Christian faith; but, unhappily, the greater part of the apostles by whom they had been proselyted, were Arians, which proved fatal to many of the orthodox Christians; for the Arian Goths persecuted them with unrelenting cruelty.

²¹⁶ ^{Remains of genuine Gothic.} About the year 367, Ulphilas bishop of the *Mœsian* Goths, translated the New Testament into the Gothic language. The remains of this translation furnish a genuine, and at the same time venerable, monument of the ancient Gothic dialect. No more is now extant of that valuable translation than the four Gospels, and another fragment containing part of the epistle to the Romans. The Gospels have been repeatedly published since the first edition by Junius 1665, down to that of Mr Lye. Other fragments of the Gothic language have also been found, which our curious readers may see in Lye's Notes to his Edition of the Gothic Gospels. The fragment of the Epistle to the Romans was lately discovered in the library at Wolfenbottle, and published by Knitel archdeacon of Wolfenbottle.

The Goths, prior to the age of Ulphilas, were ig-

norant of the use of alphabetical characters. The bishop fabricated an alphabet for them, which is a medley of Greek and Roman letters, but rather inclining to the former.

This alphabet consists of 25 letters (see PLATE IX). Junius has carefully analysed those letters, and pointed out their powers and sounds in his Gothic alphabet, prefixed to his *Glossarium Gothicum*. They were long retained in all the European languages derived from the Gothic source, which will be enumerated in the sequel.

What kind of language the ancient Gothic was, is plain from the fragments above mentioned; but in what respects it agrees with the oriental tongues, or differs from them, is not easy to ascertain with precision. We have observed in our section on the Greek, that a considerable part of that language must have been derived from the Thracian; which, according to Strabo there quoted, was the same with the Getic or Gothic. The Thracian tongue will, we are convinced upon comparison, be found analogous to the Chaldean or Syrian. The German, which is a genuine descendant of the Gothic, is full of Persian words: the old Persian or Pahlavi appears to be a dialect of the Chaldean. The learned Junius, near the beginning of his Gothic alphabet, remarks, that a very considerable part of the language in question is borrowed from the most ancient Greek.

Both the learned Ihre in his *Glossarium Suis-Gothicum*, and Wachter in his excellent German and Latin Dictionary, often remark the coincidence of Gothic and German words with oriental vocables of the like sound and of the same signification. In the old Saxon, which is another ramification of the Gothic tongue, numberless terms of the very same complexion appear. From this deduction we hope it will follow, that the Gothic tongue, in its original unmixed state as it was spoken by the ancient *Getæ*, was a dialect of the primeval language; that language which the sons of Tiras brought with them from the plains of Shinar or from Armenia, or from any other region where the primitive mortals had fixed their residence. To confirm this position, we shall annex a few instances.

The Thracian tribes, in all probability, first took possession of those parts of Asia Minor which stretch towards the east. Thence they crossed the Hellespont, and spread themselves far and wide northward. Strabo supposes that they first settled in the regions to the north of those straits, and thence transported numerous colonies into Asia Minor. The reverse was probably the case. Population, we think, proceeded northward: but be that as it may, it is universally agreed, that both sides of the Hellespont were peopled with Thracians.

In Asia Minor we meet with the city Perga, which, throwing away the *a*, is *Perg*. In every tongue descended from the Gothic, the word *Berg* signifies a "rock," and metaphorically a "town or burgh;" because towns were originally built on rocks for the sake of defence. Hence likewise *Pergamos*, the fort or citadel of Troy. *Beira* in Thracian signified a "city;" the Chaldaic and Hebrew word *Beer* imports a "well," and is possibly the original of the Gothic word *beer*, *ale*. In ancient times, especially in

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the East, it was customary to build cities in the neighbourhood of fountains. The ancients called the Phrygians *Bevyts*, *Bryges* or *Bruges*; the Gothic word coinciding is obvious. *Dyndymus*, the name of a city sacred to Cybele, is compounded of two Gothic words *dun* and *dum*, both signifying "a height, an eminence;" and hence *a town, an inclosure*. The word *tros* seems to be the very Gothic *trofs*, "brave, valiant." The words *fader*, *mader*, *dochter*, *bruder*, are so obviously Persian, that every etymologist has assigned them to that language.

Many futile etymologies have been given of the sacred name *God*, which is in reality the Persian word *Ghoda*, commonly applied by them to their *Hormazd* or *Oromazes*. The Persian *bad* or *bod* signifies a "city;" the same word in Gothic imports a "house, a mansion, an abode." *Band*, in Persian, a "strait place;" in Gothic, "to bend." *Heim* or *ham*, "a house," is generally known to be of Persian original. Much critical skill has been displayed in tracing the etymology of the Scotch and old English word *Tule*, "Christmas." *Tule*, derived from *iul*, was a festival in honour of the sun, which was originally celebrated at the winter solstice. *Wick* or *wich* is a Gothic term still preserved in many names of towns; it signifies "a narrow corner, or small strip of land jutting into the sea, or into a lake or river:" hence Latin *vicus*, and the Greek *vicus*. In Spanish, we have many old Gothic words; among others *hijo* a "son," the same with the Greek *vios*. In some places of Scotland, we call any thing that is little, small, *wee*; originally spelt *wi*, if we mistake not, from the very same word.

These few examples we have thrown together, without any regard to order, persuaded that almost every word of the language, truly Gothic, may with a little pains and judgment be traced to some oriental root or cognate. We may observe in passing, that many Gothic nouns end in *a*, like the Chaldaic and Syriac; that their substantive verb very much resembles that of the Persian, Greek, and Latin; and that their active and auxiliary verb has furnished the common præterperfect tense of Greek verbs in the active voice: that verb is *haban*, but originally *ba*, as the common people pronounce it at this day, especially in the north of Scotland, and among the Swedes, Danes, Norwegians, and Icelanders.

We shall now leave the other inferior arrangements of this ancient language to grammarians and lexicographers, and proceed to inquire what modern tongues are deduced from it as their stock, and which of them makes the nearest approaches to its simplicity and rusticity.

We have already observed that the Goths, formerly *Getæ*, were possessed of a vast extent of country, reaching from the frontiers of Thrace to the banks of the Ister or Danube. We have seen that a colony of them settled in *Moesia* under Constantine II. They then spread themselves into *Dacia*, and from thence into Germany. All these countries were situated in such a manner, that the progress of population was forward, and according to the natural course of emigration. From Germany they extended themselves into Scandinavia, that is, Sweden, Denmark, and Norway. Their whole ancient *Edda*, *Sagas*, "Chro-

nicles," show that the Goths arrived in Scandinavia by this route, without, however, fixing the era of that event with any tolerable degree of accuracy. By the Germans, we believe the ancients understood all the nations eastward, westward, and northward, reaching from the Danube on the south up to the extremity of Scandinavia on the Northern Ocean; and from the Rhine and German Ocean on the west, to the river Chronus or Niemen on the east. All those nations spoke one or other of the Gothic dialects, some approaching nearer, and others deviating farther from, the parent language.

The Francic is a dialect of the Teutonic, *Tudesque*, or old German; and the Gospels of Ulphilas bear such a resemblance to the Francic, fragments of which are preserved in the early French historians, that some learned men have pronounced those Gospels to be part of an old Francic version; but others of equal respectability have refuted this opinion, both from history and comparison of the dialects. Schilter has given us large monuments of the *Tudesque* or old German from the seventh century, which evidently prove that the Gothic of Ulphilas is the same language. Wachter's learned Glossary of the ancient German likewise confirms this position. Mr Ihre, after hesitating whether the Gospels of Ulphilas bear most resemblance to the German or Scandinavian dialect of the Gothic, declares at last in favour of the former. The Anglo-Saxon is also known to be a venerable dialect of the *Tudesque*; and is so intimately connected with the Gospels, that some valuable works on this subject are wholly built upon that supposition.

The Icelandic is the oldest relic of the Scandinavian. It begins with Arius Frode in the eleventh century, and is a dialect of the German. The remains we have of it are more modern by four centuries than those of the German: they are more polished than the other. The words are shortened, not only because they are more modern than the German, but because the Icelandic was polished by a long succession of poets and historians almost equal to those of Greece and Rome. Hence the Icelandic, being a more polished language than the German, has less affinity with the parent Gothic. The Swedish is more nearly related to the Icelandic than either the Danish or Norwegian. That the Swedish is the daughter of the Gothic, is fully shown by Mr Ihre above mentioned in his *Glossarium Suo-Gothicum*. There is, therefore, no manner of doubt as to the identity of the Gothic, preserved in Ulphilas and other ancient remains, with the German and Scandinavian tongue.

The modern German, a language spoken in a far greater extent than any other of modern Europe, resembles the Gothic Gospels more than the present Danish, Norwegian, or Swedish; and has certainly more ancient *flamina*. Its likeness to the Asiatic tongues, in harshness and inflexible thickness of sound, is very apparent.

Busbequius shows, that the clowns of Crim Tartary, remains of the ancient Goths, speak a language almost German. These clowns were no doubt descendants of the ancient Goths, who remained in their native country after the others had emigrated. It is therefore apparent from the whole of this investigation,

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from the
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Slavonian Language. tion, that the Gothic was introduced into Europe from the East, and is probably a dialect of the language originally spoken by men.

§ 3. *Of the Slavonian Language.*

220 Slavonic language. THERE is another language which pervades a considerable part of Europe, and this, like the Gothic, seems to have originated in the East. The language we mean is the Slavonic or rather Slavonic, which prevails far and wide in the eastern parts of this division of the globe. It is spoken by the Dalmatians, by the inhabitants of the Danubian provinces, by the Poles, Bohemians, and Russians. The word *slab*, that is, "slave" (whence the French word *esclave*, and our word *slave*), signifies "noble, illustrious;" but because, in the lower ages of the Roman empire, vast multitudes of these people were spread over all Europe in the quality of slaves, that word came to denote the servile tribe by way of distinction, in the same manner as the words *Geta*, *Davus*, and *Syrus*, did among the Greeks at a more early period.

221 Spoken by the Slavi one of the tribes of the Sarmatians. The Slavi dwelt originally on the banks of the Borysthenes, now the Dnieper or Nieper. They were one of the tribes of the European Sarmatians who in ancient times inhabited an immense tract of country, bounded on the west by the Vistula, now the Weisfel; on the south-east by the Euxine Sea, the Bosphorus Cimmerius, the Palus Mæotis, and the Tanais or Don, which divides Europe from Asia.

In this vast tract of country, which at present comprehends Poland, Russia, and a great part of Tartary, there dwelt in ancient times many considerable tribes. To enumerate these, we believe, would not much edify our readers: we shall only inform them, that among these Sarmatian clans were the Roxolani, now the Russians, and likewise the Slavi, who dwelt near the Borysthenes, as was observed above.

The Slavi gradually advanced towards the Danube; and in the reign of Justinian having passed that river, they made themselves masters of that part of Illyricum which lies between the Drave and the Save, and is to this day from them called *Slavonia*. These barbarians by degrees over-ran Dalmatia, Liburnia, the western parts of Macedonia, Epirus; and on the east they extended their quarters all along to the western bank of the Danube, where that river falls into the Euxine. In all these countries, the Slavonian was deeply impregnated with the Greek, which was a thing of course, since the barbarian invaders settled in those regions, and mingled with the aborigines, who spoke a corrupt dialect of that language.

222 The Poles. The Poles are the genuine descendants of the ancient Sarmatæ (c), and consequently speak a dialect of their language, but much adulterated with Latin words, in consequence of the attachment the Poles have long professed to the Roman tongue.

223 Silesians, and. The Silesians and Bohemians have corrupted their dialects in the very same manner. In those countries, then, we are not to search for the genuine remains of the ancient Sarmatian.

The modern Russians, formerly the Rhoxani or Roxolani, are the posterity of the Sarmatæ, and are a branch of the Slavi: they inhabit a part of the country which that people possessed before they fell into the Roman provinces; they speak the same language, and wear the very same dress; for, on the historical pillar at Constantinople, the Slavonians are dressed like the Russian boors. If then the Slavi are Sarmatæ, the Russians must of course be the descendants of the same people. They were long a sequestered people, and consequently altogether unconnected with the other nations of Europe. They were strangers to commerce, inhospitable to strangers, tenacious of ancient usages, averse to improvements of every kind, wonderfully proud of their imaginary importance; and, in a word, a race of people just one degree above absolute savagism. A people of this character are, for the most part, enemies to innovations; and if we may believe the Russian historians, no nation was ever more averse to innovations than the one in question. From the ninth century, at which era they embraced Christianity, it does not appear that they moved one step forward towards civilization, till Peter the Great, not a century ago, in consequence of his despotic authority, compelled them to adopt the manners and customs of their more polished neighbours.

We may then conclude, that the Russians made as little change in their language during that period, as they did in their dress, habits, and manner of living. Whatever language they spoke in the ninth century, the same they employed at the beginning of the 18th. They were, indeed, according to *Appian de bel. Mithrid.* once conquered by Diophantus, one of Mithridates's generals; but that conquest was for a moment only: they were likewise invaded, and their country over-run, by the great Timor or Tamerlane; but this invasion was like a torrent from the mountains, which spreads devastation far and wide while it rages, but makes little alteration on the face of the country.

We find likewise, that upon some occasions they made incursions upon the frontiers of the Roman empire; but we hear of no permanent settlements formed by them in these quarters. Upon the whole, we take the Russians to have been, with respect to their language, in the very same predicament with the Highlanders and Islanders of Scotland, who, according to the general opinion, have preserved the Celtic dialect pure and entire, in consequence of their having never mingled with foreigners.

225 The Russian language is the genuine Slavonian; and, secondly, that the latter is the same, or nearly the same, with the ancient Sarmatian. The Russian language genuine Slavonic.

In the Russian, there are found a great number of words resembling the old simple roots of the Greek both in sound and signification; its grammatical genius is nearly the same: and we are informed by the very best authority, that there is in this language a translation of Epictetus, in which there are whole pages, in both original and translation, without one single

(c) This appears by their character, their laws, their manners, their form of government, their military equipage, their impetuosity, their aristocratic splendor.

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single transposition. Mons. Leveque, who has published a translation of a history of Russia, is so entirely convinced of the strict analogy between the ancient Greek and the modern Russe, that he is positive that the former is derived from the latter. Mons. Freret, a very learned French academician, is clearly of the same opinion. We are, however, persuaded that this opinion is ill founded. * We rather imagine, that those coincidences arise from the relics of the primitive language of mankind; vestiges of which, we believe, are to be found almost in every tongue now existing.

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Resem-
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sian and
oriental
words.

It is, however, we allow, uncommonly difficult to render a reason for the syntactical analogy of the two languages, without admitting the truth of the one or the other hypothesis. We have examined with some care a good number of Russian vocables, and compared them with Greek ones of the same signification. We have not, however, found such a resemblance as we think necessary to support the position advanced above. We have indeed found a very strong resemblance between the former and many oriental words, especially Hebrew, Chaldean, and old Persian, of which we could produce several instances, did the nature of our present inquiry admit such a deviation. Every body knows that the Sarmatæ were divided into two great nations, the Asiatic and European; the former extended very far eastward, behind the mountain Caucasus, the northern shore of the Euxine Sea, and so forth. These, we may believe, derived their language from the original tongue long before the Greek language existed. This, in comparison of the Hebrew, Phœnician, Egyptian, Arabian, Chaldean, &c. was but of yesterday. The Greek, most learned men are now convinced, was a late composition of many different dialects, incorporated with the jargon of the aboriginal Ionim or Greeks. The Sarmatian, on the contrary, was the tongue of a great and populous nation, civilized, in all appearance, long before the Greeks began to emerge from a state of savagism. We are, therefore, by no means disposed to allow, either that the Greek is derived from the Russian, or the Russian from the Greek. We believe there is just the same reason for this conclusion, that the Abbé Pezron and Mons. Gebelin pretend to have discovered, in order to support their position that the Greek is derived from the Celtic. Certain it is, that the resemblance among the oriental languages, of which we take the Sarmatian to have been one, is so palpable, that any person of a moderate capacity who is perfectly master of one, will find little difficulty in acquiring any other. If, therefore, the coincidence between the Greek and Russian should actually exist, we think this circumstance will not authenticate the supposition, that either of the two is derived from the other.

In the course of this argument, our readers will be pleased to observe, that we all along suppose, that the Slavonian, of which we think the Russian is the most genuine remain, is the same with the old Sarmatian. We shall now take the liberty to hazard a conjecture with respect to the syntactical coincidence of that language with the Greek; for we acknowledge that we are not so profoundly versed in the Russian dialect of

the Slavonian as to pretend to pronounce a definitive sentence.

As the Russians were a generation of savages, there is no probability that they were acquainted with the use of letters and alphabetical writing till they acquired that art by intercourse with their neighbours. It is certain, beyond all contradiction, that few nations had made less proficiency in the fine arts than that under consideration: and we think there is little appearance of their having learned this art prior to their conversion to Christianity. Certain it is, that the Slavi, who settled in Dalmatia, Illyria, and Liburnia, had no alphabetical characters till they were furnished with them by St Jerome. The Servian character, which very nearly resembles the Greek, was invented by St Cyril; on which account the language written in that character is denominated *Chirilizza*. These Slavonic tribes knew nothing of alphabetic writing prior to the era of their conversion. The Mœsian Goths were in the same condition till their Bishop Ulphilas fabricated them a set of letters.

If the Slavi and Goths, who resided in the neighbourhood of the Greeks and Romans, had not learned alphabetical writing prior to the era of their conversion to Christianity, it must hold *à fortiori*, that the Russians, who lived at a very great distance from those nations, knew nothing of this useful art antecedent to the period of their embracing the Christian faith.

The Russians pretend that they were converted by St Andrew; but this is known to be a fable. Christianity was first introduced among them in the reign of the grand Duke Wolodimar, who marrying the daughter of the Grecian emperor Basilus, became her convert about the year 989. About this period, we imagine, they were taught the knowledge of letters by the Grecian missionaries, who were employed in teaching them the elements of the Christian doctrines. Their alphabet consists of 31 letters, with a few obsolete additional ones; and these characters resemble those of the Greeks so exactly, that there can be no doubt of their being copied from them. It is true, the shape of some has been somewhat altered, and a few barbarian ones have been intermingled. The Russian liturgy, every body knows, was copied from that of the Greeks; and the best specimen of the old Russian is the church offices for Easter, in the very words of Chrysostom, who is called by his name *Zlato-ustii*, "golden-mouthed." The power of the clergy in Russia was excessive; and no doubt their influence was proportioned to their power. The first race of clergy in that country were undoubtedly Greeks. We know how active and industrious those people were in propagating their language as well as their religion. The offices of religion might be at first written and pronounced in the Greek tongue, but it would soon be found expedient to have them translated into Russian. The persons employed in this work must have been Greeks, who understood both languages.

As it is confessedly impossible that a people so dull and uninventive as the Russians originally were, could ever have fabricated a language so artificially constructed as their present dialect; and as it is obvious, that, till Christianity was introduced among them by the Greeks, they could have no correspondence with that

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Origin of
the syntactical
coincidence be-
tween this
language
and the
Greek.

Slavonian Language. people—it must appear surprising by what means their language came to be fashioned so exactly according to the Greek model. We have observed above, that the Russian letters must have been invented and introduced into that country by the Greek missionaries. We think it probable, that those apostles, at the same time that they taught them a new religion, likewise introduced a change into the idiom of their language. The influence of those ghostly teachers over a nation of savages must have been almost boundless; the force of their precepts and example almost incontrollable. If the savage converts accepted a new religion from the hands of those Grecian apostles, they might with equal submission adopt improvements in their language. Such of the natives as were admitted to the sacerdotal function must have learned the Greek language, in order to qualify them for performing the offices of their religion. A predilection for that language would be the immediate consequence. Hence the natives, who had been admitted into holy orders, would co-operate with their Grecian masters in improving the dialect of the country; which, prior to the period above mentioned, must have greatly deviated from the original standard of the Sarmatian tongue.

Upon this occasion, we imagine the Greek apostles, in conjunction with their Russian disciples, reduced the language of the country to a resemblance with the Greek idiom. They retained the radical vocables as they found them; but by a variety of flexions, conjugations, derivations, compositions, and other modifications, transformed them into the Grecian air and apparel. They must have begun with the offices of the church; and among a nation of savages newly converted, the language of the new religion would quickly obtain a very extensive circulation. When the Grecian garniture was introduced into the church, the laity would in process of time assume a similar dress. The fabric of the Grecian declensions, conjugations, &c. might be grafted upon Russian stocks without affecting the radical parts of the language. If the dialect in question, like most others of a very ancient date, laboured under a penury of vocables, this manœuvre would contribute exceedingly to supply that defect. By this expedient the Greek language itself had been enlarged from about 300 radical terms to the prodigious number of words of which it now consists.

The Latin tongue we have seen above in its original constitution differed widely from the Greek; and notwithstanding this incongruity, the improvers of the former have pressed it into a very strict agreement with the latter. This, we think, was still a more difficult task; as, in our opinion, the genius of the Latin differs in a much greater degree than that of the Russian does from the Greek. We know, that the genius of the Gothic tongue and those of all its descendants are much more in unison with the Greek than with that of the Latin. The Spanish, Italian, and French, have cudgelled many of their Gothic, Teutonic, and Celtic verbs, into a kind of conjugations, imitating or rather aping those of the Latin. The Persians have formed most elegant and energetic declensions and conjugations, upon inflexible roots, borrowed from the Pahlavi and Deri, and even from Tartar originals.

Upon the grounds above-mentioned we have taken

Slavonian Language. the liberty to hazard the following conjectures, which we cheerfully submit to the cognizance of our more enlightened readers.

1. That the Sarmatian was a dialect of the original language of mankind.
2. That the Slavonian was a dialect of the Sarmatian.
3. That the Russe is the most genuine unsophisticated relick of the Slavonian and Sarmatian.
4. That the Russians had no alphabetic characters prior to the era of the introduction of Christianity, that is, towards the end of the tenth century.
5. That they were converted by Grecian missionaries.
6. That those missionaries copied their present letters from those of Greece; and in conjunction with the more enlightened natives, reduced the original unimproved Russe to its present resemblance to the Greek standard.

The Russian language, like most others, contains ²¹⁹ eight parts of speech, noun, pronoun, &c. Russian nouns. Its nouns have three genders, masculine, feminine, and neuter; it has also a common gender for nouns, intimating both sexes. It has only two numbers, singular and plural. Its cases are seven, nominative, genitive, dative, accusative, vocative, instrumental, and prepositive. These cases are not formed by varying the termination, as in Greek and Latin; but generally by placing a vowel after the word, as, we imagine, was the original practice of the Greeks (See Greek Section). Thus in Russe, *рука* "hand;" nominative, *рука* "the hand;" genitive, *руки* "of the hand," &c. See *Les Elem. de la Langue Russe par Charpentier*. Nouns substantive are reduced to four declensions, and adjectives make a fifth. ²²⁰ Adjectives. These agree with their substantives in case, gender, and number. They have three degrees of comparison, as is common in other languages; the positive, comparative, and superlative. The comparative is formed from the feminine of the nominative singular of the positive, by changing *a* into *ie*, that is, *aié* in English; the superlative is made by prefixing *пре*, *pre*, before the positive. These rules are general; for the exceptions, recourse must be had to the Russian grammar above-mentioned.

The numeral adjectives in Russe have three genders like the rest, and are declined accordingly. Their pronouns have nothing peculiar, and are divided and arranged in the same manner as in other languages. Verbs in the Russian language are comprehended under two conjugations. The moods are only three; the indicative, the imperative, and the infinitive: the subjunctive is formed by placing a particle before the indicative. Its tenses are eight in number; the present, the imperfect, the preterite simple, the preterite compound, the pluperfect, the future indeterminate, the future simple, the future compound. The verbs have their numbers and persons as in other languages. To enter into a detail of their manner of conjugating their verbs would neither be consistent with our plan, nor, we are persuaded, of much consequence to our readers. Their other parts of speech differ nothing from those of other languages. Their syntax nearly resembles that of the Greek and Latin. All these articles must be learned from a grammar of the language. Whether there is any grammar of the Russian language composed

Slavonian
Language.

fed in English we know not. That of Mons. Charpentier in French, printed at Petersburg in 1768, is the only one we have seen, and which appears to us a very excellent one. We could wish to be able to gratify our readers with a more authentic account of the origin of the Slavonian language; but this we find impossible, in consequence of the want of memorials relating to the state of the ancient Sarmatæ. Towards the era of the subversion of the western empire, the nations who inhabited the countries in question were so blended and confounded with each other, and with Huns and other Scythian or Tartar emigrants, that we believe the most acute antiquarian would find it impossible to investigate their respective tongues, or even their original residence or extraction. We have selected the Russe as the most genuine branch of the old Slavonian, and to this predilection we were determined by the reasons above mentioned. We are sorry that we are not so well acquainted with the idiom of the Russian language as to be able to compare it with those of the east; but upon such a comparison, we are persuaded that the radical materials of which it is composed would be found to have originated in the oriental regions. The word *Tsar*, for example, is probably the Phœnician and Chaldean *Sar* or *Zar*, "a prince, a grandee." Diodorus Siculus calls the queen of the Massagetæ, who, according to Ctesias, cut off Cyrus's head, *Zarina*; which was not many years ago the general title of the empress of all the Russias. Herodotus calls the same princess *Tomyris*, which is the very name of the famous Timor or Tamur, the conqueror of Asia. The former seems to have been the title, and the latter the proper name, of the queen of the Massagetæ. In the old Persian or Pahlavi, the word *Gard* signifies "a city;" in Russian, *Gorad* or *Grad* intimates the very same idea: hence *Constantinople* in old Russe is called *Tsargrad* or *Tsargorad*. These are adduced as a specimen only; an able etymologist might, we believe, discover a great number.

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Phœnician
and Chal-
dean words
in Russe.

The Slavonian language is spoken in Epirus, the western part of Macedonia, in Bosnia, Servia, Bulgaria, in part of Thrace, in Dalmatia, Croatia, in Poland, Bohemia, Russia, and Mingrelia in Asia, whence it is frequently used in the seraglio at Constantinople. Many of the great men of Turkey understand it, and frequently use it; and most of the janizaries having been stationed in garrisons in the Turkish frontiers in Europe, use it as their vulgar tongue. The Hungarians, however, and the natives of Wallachia, speak a different language: and this language bears evident signatures of the Tartarian dialect, which was the tongue of the original Huns. Upon the whole, the Slavonian is by much the most extensive language in Europe, and extends far into Asia.

SECT. X. Modern Languages.

If we call all the different dialects of the various nations that now inhabit the known earth, languages, the number is truly great; and vain would be his ambition who should attempt to learn them, though but imperfectly. We will begin with naming the principal of them: There are four, which may be called

original or mother-languages, and which seem to have given birth to all that are now spoken in Europe. These are the *Latin*, *Celtic*, *Gothic*, and *Slavonian*. It will not, however, be imagined, from the term *original* given to these languages, that we believe them to have come down to us, without any alteration, from the confusion of tongues at the building of the tower of Babel. We have repeatedly declared our opinion, that there is but one truly original language, from which all others are derivatives variously modified. The four languages just mentioned are original only as being the immediate parents of those which are now spoken in Europe.

Modern
Languages.
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Parent dia-
lects of Eu-
rope, with
their re-
spective off-
spring.

I. From the *Latin* came,

1. The Portuguese.
2. Spanish.
3. French.
4. Italian.

From the *Celtic*,

5. The Erse, or Gaelic of the Highlands of Scotland.
6. The Welsh.
7. The Irish.
8. Basse-Bretagne.

From the *Gothic*,

9. The German.
10. The Low Saxon or Low German.
11. The Dutch.
12. The English; in which almost all the noun-substantives are German, and many of the verbs French, Latin, &c. and which is enriched with the spoils of all other languages.
13. The Danish.
14. The Norwegian.
15. Swedish.
16. Icelandic.

From the *Slavonian*,

17. The Polonese.
18. The Lithuanian.
19. Bohemian.
20. Transylvanian.
21. Moravian.
22. The modern Vandalian, as it is still spoken in Lusatia, Prussian Vandalia, &c.
23. The Croatian.
24. The Russian or Muscovite; which, as we have seen, is the purest dialect of this language.
25. The language of the Calmucs and Cossacs.
26. Thirty-two different dialects of nations who inhabit the north-eastern parts of Europe and Asia, and who are descended from the Tartars and Huno-Scythians. There are polyglott tables which contain not only the alphabets, but also the principal distinct characters of all these languages.

II. The languages at present generally spoken in Asia are,

27. The Turkish and Tartarian, with their different dialects.
28. The Persian.
29. The Georgian or Iberian.
30. The Albanian or Circassian.
31. The Armenian.

These languages are spoken by the Greek Christians in Asia, under the patriarch of Constantinople.

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Asiatic
languages

Modern Languages. 32. The modern Indian.

33. The Formosan.

34. The Indo-tanic.

35. The Malabarian.

36. The Warugian.

37. The Talmulic or Damulic.

38. The modern Arabic.

39. The Tangusian.

40. The Mungalic.

41. The language of the Nigarian or Akar Nigarian.

42. The Grufinic or Grufinian.

43. The Chinese.

44. The Japonese.

The Danish missionaries who go to Tranquebar, print books at Hall in these languages.

We have enumerated here those Asiatic languages only of which we have some knowledge in Europe, and even alphabets, grammars, or other books that can give us information concerning them. There are doubtless other tongues and dialects in those vast regions and adjacent islands; but of these we are not able to give any account.

III. The principal languages of Africa are,

45. The modern Egyptian.

46. The Fetuitic, or the language of the kingdom of Fetu.

47. The Moroccan; and,

48. The jargons of those savage nations who inhabit the desert and burning regions. The people on the coast of Barbary speak a corrupt dialect of the Arabic. To these may be added the Chilhic language, otherwise called *Tamazeght*; the Negritian, and that of Guinea; the Abyssinian; and the language of the Hottentots.

IV. The languages of the American nations are but little known in Europe. Every one of these, though distant but a few days journey from each other, have their particular language or rather jargon. The languages of the Mexicans and Peruvians seem to be the most regular and polished. There is also one called *Poconchi* or *Pocomana*, that is used in the bay of Honduras and toward Guntimal, the words and rules of which are most known to us. The languages of North America are in general the Algonhic, Apalachian, Mohogic, Savanahamic, Virginic, and Mexican: and in South America, the Peruvian, Caribic, the language of Chili, the Cairic, the Tucumanian, and the languages used in Paraguay, Brasil, and Guiana.

V. We have already said, that it would be a vain and senseless undertaking for a man of letters to attempt the study of all these languages, and to make his head an universal dictionary; but it would be still more absurd in us to attempt the analysis of them in this place: some general reflections therefore must here suffice. Among the modern languages of Europe, the French seems to merit great attention; as it is elegant and pleasing in itself; as it is become so general, that with it we may travel from one end of Europe to the other without scarce having any occasion for an interpreter; and as in it are to be found excellent works of every kind, both in verse and prose, useful and agreeable. There are, besides, grammars and dictionaries of this language which give us every information concerning it, and very able masters

who teach it; especially such as come from those parts of France where it is spoken correctly; for with all its advantages, the French language has this inconvenience, that it is pronounced scarce anywhere purely but at Paris and on the banks of the Loire. The language of the court, of the great world, and of men of letters, is moreover very different from that of the common people; and the French tongue, in general, is subject to great alteration and novelty. What pity it is, that the style of the great Corneille, and that of Moliere, should already begin to be obsolete, and that it will be but a little time before the inimitable *chefs d'œuvres* of those men of sublime genius will be no longer seen on the stage! The most modern style of the French, moreover, does not seem to be the best. We are inclined to think, that too much conciseness, the epigrammatic point, the antithesis, the paradox, the sententious expression, &c. diminish its force; and that, by becoming more polished and refined, it loses much of its energy.

VI. The German and Italian languages merit likewise a particular application; as does the English, perhaps above all, for its many and great excellencies (See LANGUAGE). Authors of great ability daily labour in improving them; and what language would not become excellent, were men of exalted talents to make constant use of it in their works? If we had in Iroquois books like those which we have in English, Italian, French, and German, should we not be tempted to learn that language? How glad should we be to understand the Spanish tongue, though it were only to read the *Araucana* of Don Alonzo D'Ercilia, *Don Quixote*, some dramatic pieces, and a small number of other Spanish works, in the original; or the poem of Camoens in Portuguese.

VII. The other languages of Europe have each their beauties and excellencies. But the greatest difficulty in all living languages constantly consists in the pronunciation, which it is scarce possible for any one to attain unless he be born or educated in the country where it is spoken: and this is the only article for which a master is necessary, as it cannot be learned but by teaching or by conversation: all the rest may be acquired by a good grammar and other books. In all languages whatever, the poetic style is more difficult than the prosaic: in every language we should endeavour to enrich our memories with great store of words (*copia verborum*), and to have them ready to produce on all occasions: in all languages it is difficult to extend our knowledge so far as to be able to form a critical judgment of them. All living languages are pronounced rapidly, and without dwelling on the long syllables (which the grammarians call *moram*): almost all of them have articles which distinguish the genders.

VIII. Those languages that are derived from the Latin have this further advantage, that they adopt without restraint, and without offending the ear, Latin and Greek words and expressions, and which by the aid of a new termination appear to be natives of the language. This privilege is forbidden the Germans, who in their best translations dare not use any foreign word, unless it be some technical term in case of great necessity.

Philomathes
||
Philopœmen.

PHILOMATHES, a lover of learning or science. **PHILOMELA**, in fabulous history, was a daughter of Pandion king of Athens, and sister to Procne, who had married Tereus king of Thrace. Procne separated from Philomela, to whom she was much attached, spent her time in great melancholy till she prevailed upon her husband to go to Athens and bring her sister to Thrace. Tereus obeyed; but he had no sooner obtained Pandion's permission to conduct Philomela to Thrace, than he fell in love with her, and resolved to gratify his passion. He dismissed the guards whom the suspicions of Pandion had appointed to watch him; offered violence to Philomela; and afterwards cut out her tongue, that she might not discover his barbarity, and the indignities she had suffered. He confined her in a lonely castle; and having taken every precaution to prevent a discovery, he returned to Thrace, and told Procne that Philomela had died by the way, and that he had paid the last offices to her remains. At this sad intelligence Procne put on mourning for the loss of Philomela; but a year had scarcely elapsed before she was secretly informed that her sister was not dead. Philomela, in her captivity, described on a piece of tapestry her misfortunes and the brutality of Tereus, and privately conveyed it to Procne. She was going to celebrate the orgies of Bacchus when she received it, but she disguised her resentment; and as during those festivals she was permitted to rove about the country, she hastened to deliver her sister Philomela from her confinement, and concerted with her on the best measures of punishing the cruelty of Tereus. She murdered her son Itylus, then in the sixth year of his age, and served him up as food before her husband during the festival. Tereus, in the midst of his repast, called for Itylus; but Procne immediately informed him that he was then feasting on his flesh, when Philomela, by throwing on the table the head of Itylus, convinced the monarch of the cruelty of the scene. He drew his sword to punish Procne and Philomela; but as he was going to stab them to the heart, he was changed into a hoopoe, Philomela into a nightingale, Procne into a swallow, and Itylus into a pheasant. This tragedy happened at Daulis in Phocis; but Pausanias and Strabo, who mention the whole of the story, are silent about the transformation; and the former observes, that Tereus, after this bloody repast, fled to Megara, where he laid violent hands on himself. The inhabitants of the place raised a monument to his memory, where they offered yearly sacrifices, and placed small pebbles instead of barley. It was on this monument that the birds called hoopoes were first seen; hence the fable of his metamorphosis. Procne and Philomela died through excess of grief and melancholy; and as the nightingale's and the swallow's voice is peculiarly plaintive and mournful, the poets have embellished the fable by supposing that the two unfortunate sisters were changed into birds.

PHILONIUM, in pharmacy, a kind of somniferous anodyne opiate, taking its name from Philo the inventor.

Ancient Universal History, vol. vi.

PHILOPÆMEN, a celebrated general of the Achaean league, was born in Megalopolis, a city of Arcadia, in Peloponnesus; and from his very infancy discovered a strong inclination to the profession of

arms. He was nobly educated by Cassander of Mantinea; a man of great probity, and uncommon abilities. He was no sooner able to bear arms than he entered among the troops which the city of Megalopolis sent to make incursions into Laconia, and in these roads never failed to give some remarkable instance of his prudence and valour. When there were no troops in the field, he used to employ his leisure time in hunting and such other manly exercises. When Cleomenes king of Sparta attacked Megalopolis, Philopœmen displayed much courage and greatness of soul. He signalized himself no less some time after, in the battle of Sellasia, where Antigonus gained a complete victory over Cleomenes. Antigonus, who had been an eye-witness of his prudent and intrepid behaviour, made very advantageous offers to gain him over to his interest; but he rejected them, having an utter aversion to a court life, which he compared to that of a slave, saying, that a courtier was but a slave of a better condition. As he could not live idle and inactive, he went to the isle of Crete, which was then engaged in war, and served there as a volunteer till he acquired a complete knowledge of the military art; for the inhabitants of that island were in those days accounted excellent warriors, being scarce ever at peace among themselves. Philopœmen, having served some years among the troops of that island, returned home, and was upon his arrival appointed general of the horse; in which command he behaved so well, that the Achaean horse, heretofore of no reputation, became in a short time famous all over Greece. He was soon after appointed general of all the Achaean forces, when he applied himself to the re-establishing of military discipline among the troops of the republic, which he found in a very low condition, and universally despised by their neighbours. Aratus, indeed, was the first that raised the Achaean state to that pitch of power and glory to which it arrived; but the success of his enterprises was not so much owing to his courage and intrepidity as to his prudence and politics. As he depended on the friendship of foreign princes, and their powerful succours, he neglected the military discipline at home; but the instant Philopœmen was created prætor, or commander in chief, he roused the courage of his countrymen, in order to put them into a condition to defend themselves without the assistance of foreign allies. With this view he made great improvements in the Achaean discipline; changing the manner of their exercise and their arms, which were both very defective. He had thus, for the space of eight months, exercised his troops every day, making them perform all the motions and evolutions, and accustoming them to manage with dexterity their arms, when news was brought him that Machanidas was advancing, at the head of a numerous army, to invade Achaia. He was glad of this opportunity to try how the troops had profited by his discipline; and accordingly, taking the field, met the enemy in the territories of Mantinea, where a battle was fought. Philopœmen, having killed Machanidas with his own hand, struck off his head, and carried it from rank to rank, to encourage his victorious Achæans, who continued the pursuit, with great slaughter, and incredible ardour, to the city of Tegea, which they entered together with the fugitives. The Lacedæmonians lost

Philopœmen.

Philopœmen. on this occasion above 8000 men, of which 4000 were killed on the spot, and as many taken prisoners. The loss of the Achæans was very inconsiderable, and those that fell were mostly mercenaries. This happened about the year before Christ 204.

But what most of all raised the fame and reputation of Philopœmen was his joining the powerful city of Lacedæmon to the Achæan commonwealth; by which means the Achæans came to eclipse all the other states of Greece. This memorable event happened in the year 191. In this transaction we cannot help taking notice of one circumstance, which, in our opinion, reflects greater lustre on Philopœmen than all his warlike exploits. The Lacedæmonians, overjoyed to see themselves delivered from the oppressions they had long groaned under, ordered the palace and furniture of Nabis to be sold; and the sum accruing from thence, to the amount of 120 talents, to be presented to Philopœmen, as a token of their gratitude. Deputies therefore were to be appointed, who should carry the money, and desire Philopœmen, in the name of the senate, to accept of the present. On this occasion it was that the virtue of the generous Achæan appeared in its greatest lustre; for so great was the opinion which the Spartans had of his probity and disinterestedness, that no one could be found who would take upon him to offer the present: struck with veneration, and fear of displeasing him, they all begged to be excused. At last they obliged, by a public decree, one Timolaus, who had formerly been his guest, to go to Megalopolis, where Philopœmen lived, and offer him this testimony of their regard. Timolaus, with great reluctance, set out for Megalopolis, where he was kindly received and entertained by Philopœmen. Here he had an opportunity of observing the strictness of his whole conduct, the greatness of his mind, the frugality of his life, and the regularity of his manners; which struck him with such awe, that he did not dare once to mention the present he was come to offer; insomuch that, giving some other pretence to his journey, he returned home with the money. The Lacedæmonians sent him again; but he could no more prevail upon himself now than the first time to mention the true cause of his journey. At last, going a third time, he ventured, with the utmost reluctance, to acquaint Philopœmen with the offer he had to make in the name of the Lacedæmonians. Philopœmen heard him with great calmness; but the instant he had done speaking, he set out with him for Sparta, where, after having acknowledged his obligation to the Spartans, he advised them to lay out their money in reforming or purchasing those miscreants who divided the citizens, and set them at variance by means of their seditious discourses; to the end that, being paid for their silence, they might not occasion so many distractions in the government: "for it is much more advisable (said he) to stop an enemy's mouth than a friend's; as for me, I shall always be your friend, and you shall reap the benefit of my friendship without expence." Such was the disinterestedness of this noble Achæan!

About two years after this the city of Messene withdrew itself from the Achæan league. Philopœmen attacked them; but was wounded, taken prisoner, and poisoned by the magistrates. Thus died one of

the greatest heroes that Greece or any other country ever produced. He was no way inferior in valour, military knowledge, and virtue, to any of the boasted heroes of Rome. Had Achaia been nearer to an equality with Rome, he would have preserved his country from the yoke which the Roman republic forced it to bear. Both the Greek and Roman writers put him upon the level with Hannibal and Scipio, who were his contemporaries, and happened to die the same year. They allow him to have been not only one of the greatest commanders, but also one of the greatest statesmen of his age. To his valour and prudence Achaia owed her glory, which upon his death began to decline, there being none after him in that republic able to oppose her enemies with the like steadiness and prudence: whence Philopœmen was called the last of the Greeks, as Brutus was afterwards styled the last of the Romans.

PHILOSOPHER, a person versed in philosophy; or one who makes profession of, or applies himself to, the study of nature and morality.

Philosopher's Stone, the greatest object of alchemy, is a long-sought for preparation, which, when found, is to convert all the true mercurial part of metal into pure gold, better than any that is dug out of mines or perfected by the refiner's art.

Some Greek writers in the fourth and fifth centuries speak of this art as being then known; and towards the end of the 13th century, when the learning of the East had been brought hither by the Arabians, the same pretensions began to spread through Europe. It is supposed that this art, called *alchemy*, was of Egyptian origin; and that, when the ancient Greek philosophers travelled into Egypt, they brought back some of the allegoric language of this Egyptian art, ill understood, which afterwards passed into their mythology. Alchemy was the earliest branch of chemistry, considered as a philosophical science: in the other parts of chemical knowledge, facts preceded reasoning or speculation; but alchemy was originally speculative. See **TRANSMUTATION**.

The alchemists supposed the general principals of metals to be chiefly two substances, which they called mercury and sulphur; they apprehended also, that the pure mercurial, sulphureous, or other principles of which they imagined gold to be composed, were contained separately in other bodies: and these principles, therefore, they endeavoured to collect, and to concoct and incorporate by long digestions; and by thus conjoining the principles of gold, if they could be so procured and conjoined, it might be expected that gold would be produced. But the alchemists pretend to a product of a higher order, called *the elixir, the medicine for metals, the tincture, the philosopher's stone*; which, by being projected on a large quantity of any of the inferior metals in fusion, should change them into fine gold; which being laid on a plate of silver, copper, or iron, and moderately heated, should sink into the metal, and change into gold all the parts to which it was applied; which, on being properly heated with pure gold, should change the gold into a substance of the same nature and virtue with itself, so as thus to be susceptible of perpetual multiplication; and which, by continued coction, should have its power more and

Philosopher's Stone.

Philoso-
pher's
Stone.

more exalted, so as to be able to transmute greater and greater quantities of the inferior metals, according to its different degrees of perfection.

Alchemists have attempted to arrive at the making of gold by three methods: the first by separation; for every metal yet known, it is affirmed, contains some quantity of gold; only, in most, the quantity is so little as not to defray the expence of getting it out.

The second is by maturation; for the alchemists think mercury is the basis and matter of all metals; that quicksilver purged from all heterogeneous bodies would be much heavier, denser, and simpler, than the native quicksilver; and that by subtilizing, purifying, and digesting it with much labour, and long operations, it is possible to convert it into pure gold.

This method is only for mercury. With respect to the other metals, it is ineffectual, 1. Because their matter is not pure mercury, but has other heterogeneous bodies adhering to it; and, 2. Because the digestion, whereby mercury is turned into gold, would not succeed in other metals, because they had not been long enough in the mines.

Weight is the inimitable character of gold, &c. Now mercury, they say, has always some impurities in it, and these are lighter than mercury. Could they be purged away, which they think is not impossible, mercury would be as heavy as gold; and what is as heavy as gold is gold, or at least might very easily be made gold.

The third method is by transmutation, or by turning all metals readily into pure gold, by melting them in the fire, and casting a little quantity of a certain preparation into the fused matter; upon which the feces retire, are volatilized and burnt, and carried off, and the rest of the mass is turned into pure gold. That which works this change in the metals is called the *philosopher's stone*. See TRANSMUTATION.

Whether this third method be possible or not, it is difficult to say. We have so many testimonies of it from persons who on all other occasions speak truth, that it is hard to say they are guilty of direct falsehood, even when they say that they have been masters of the secret. We are told, that it is only doing that by art which nature does in many years and ages. For as lead and gold differ but little in weight, therefore there is not much in lead beside mercury and gold. Now, if we had any body which would so agitate all the parts of lead as to burn all that is not mercury therein, and had also some sulphur to fix the mercury, would not the mass remaining be converted into gold? There is nothing in nature so heavy as lead except gold, mercury, and platina, which was not known to these reasoners; it is evident, therefore, there is something in lead that comes very near to gold. But in lead there is likewise some heterogeneous matter different both from mercury and gold. If therefore 19 ounces of lead be dissolved by the fire, and 8 ounces be destroyed by these means, it is argued that we shall have the rest good gold; the ratio of lead to gold being as 11 to 19. If then the philosopher's stone can purify the mercurial matter in lead, so as that nothing shall remain but the pure mercurial body, and you can fix and coagulate this by means of sulphur, out of 19 ounces of lead you will have 11 of gold: or, if you reduce the lead from 18 to 14, you will then have

converted it into mercury; and if you farther purify this mercury to the proper standard, you will have gold; provided you have but a sulphur with which to fix and coagulate it. Such is the foundation of the opinion of the philosopher's stone; which the alchemists contend to be a most subtle, fixed, concentrated fire, which, as soon as it melts with any metal, does, by a magnetic virtue, immediately unite itself to the mercurial body of the metal, volatilize and cleanse off all that is impure therein, and leave nothing but a mass of pure gold. Many frauds and artifices have unquestionably been practised in this operation, and there might be political reasons why princes and others should encourage those who pretended to a power of furnishing this inexhaustible source of wealth; but it would be wrong to censure as impostors all those who have declared themselves convinced, from their own experiments, of the transmutability of base metals into gold. There are strong reasons, however, to believe that the authors have been deceived themselves by fallacious appearances. Mr Boyle gives an account of a process by which he imagines part of the substance of gold to have been transmuted into silver. He also relates a very extraordinary experiment, under the title of the degradation of gold by an anti-elixir, which was published in his own life-time, and since reprinted in 1739. Hence many have been led to conclude in favour of the alchemical doctrine of the transmutability of metals. See an account of this experiment, with remarks upon it by Dr Lewis, in his *Commerce of Arts*, sect. 12. p. 297, &c.

"The opinion (says Holt) that one metallic or other foreign substance might be changed into another, was, it seems, at this time (reign of Henry VI. of England) propagated by certain chemists, whose observations on the surprising effects and alterations produced in certain substances by the force of heat carried their imaginations beyond what sound judgment might warrant. The first instance of which on record is in vol. xi. p. 68. of the *Fadera*; wherein Henry VI. grants a licence to John Cobbe, freely to work in metals; he having, by philosophical art, found out a method of transferring imperfect metals into perfect gold and silver.

"This pretended secret, known afterwards by the name of the *philosopher's stone* or *powder*, was encouraged by four licences, granted to different projectors during this reign, and at sundry times after, during this century particularly, and in succeeding times, all over Europe. The frenzy has not entirely ceased even to this day, although it meets with neither public encouragement nor countenance from men of sober reason; the projectors having yet found nothing from their airy schemes in this mode of search but certain ruin to their property."

The same author, when speaking of the commerce of the kingdom, and the wonderful increase and riches of commercial cities, speaks thus: "This is the true philosopher's stone, so much sought after in former ages, the discovery of which has been reserved to genius, when studying to improve the mechanic arts. Hence a pound of raw materials is converted into stuffs of fifty times its original value. And the metals too are not, indeed, transmuted into gold—they are more: for

Philoso-
pher's
Stone.

Characters
of the Kings
and Queens
of England.

Philosophic.

for the labour of man has been able to work the baser metal, by the ingenuity of art, so as to become worth more than many times its weight in gold."

PHILOSOPHIC, or PHILOSOPHICAL, something belonging to PHILOSOPHY.

PHILOSOPHICAL egg, among chemists, a thin glass body or bubble, of the shape of an egg, with a long neck or stem, used in digestions.

PHILOSOPHIZING, rules of. See *NEWTONIAN Philosophy*, n° 16. and the following article.

Philosophical, Philosophizing.

P H I L O S O P H Y,

Definitions of philosophy.

IS a word derived from the Greek, and literally signifies the *love of wisdom* (A). In its usual acceptation, however, it denotes a science, or collection of sciences, of which the universe is the object; and of the term thus employed many definitions have been given, differing from one another according to the different views of their several authors. By Pythagoras, philosophy is defined *ἐπιστήμη τῶν ὄντων*, "the knowledge of things existing;" by Cicero, after Plato, *scientia rerum divinarum et humanarum cum causis*; and by the illustrious Bacon, *interpretatio naturæ*. Whether any of these definitions be sufficiently precise, and at the same time sufficiently comprehensive, may be questioned; but if philosophy in its utmost extent be capable of being adequately defined, it is not here that the definition should be given. "Explanation (says an acute writer*), is the first office of a teacher; definition, if it be good, is the last of the inquirer after truth; but explanation is one thing, and definition quite another." It may be proper, however, to observe, that the definition given by Cicero is better than that of Pythagoras, because the chief object of the philosopher is to ascertain the *causes* of things; and in this consists the difference between his studies and those of the natural historian, who merely enumerates phenomena, and arranges them into separate classes.

* Tatbam's Chart and Scale of Truth, v. i. p. 8.

Its objects.

The principal objects of philosophy are, God, nature, and man. That part of it which treats of God is called *theology*; that which treats of nature, *physics* and *metaphysics*; and that which treats of man, *logic* and *ethics*. That these are not separate and independent sciences, but, as Bacon expresses it (B), branches from the same trunk, we shall endeavour to show, after we have given, agreeably to our usual plan, a short history of philosophy from the earliest ages to the present day.

To attempt to assign an *origin* to philosophy, would

be ridiculous; for every man endeavours to ascertain the causes of those changes which he observes in nature; and even children themselves are inquisitive after that which produces the sound of their drums and their rattles. Children, therefore, and the most illiterate vulgar, have in all ages been philosophers. But the first people among whom philosophy was cultivated as a profession, was probably the Chaldeans. We certainly read of none earlier; for though we have more authentic accounts of the Hebrews than of any other nation of remote antiquity, and have reason to believe that no people was civilized before them, yet the peculiar circumstances in which they were placed, rendered all philosophical investigation to them useless, and even tended to suppress the very spirit of enquiry. The Egyptians indeed pretended to be the first of nations, and to have spread the blessings of religion and the light of science among every other people; but, from the earliest records now extant, there is reason to believe that the Chaldeans were a civilized and powerful nation before the Egyptian monarchy was founded.

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Of the Chaldean philosophy much has been said, but very little is known. Astronomy seems to have been their favourite study; and at the era of Alexander's conquest of their country, they boasted that their ancestors had continued their astronomical observations through a period of 470,000 years. Extravagant claims to antiquity have been common in all nations (C). Calisthenes, who attended the Macedonian conqueror, was requested by Aristotle to inform himself concerning the origin of science in Chaldea; and upon examining into the grounds of this report, he found that their observations reached no farther backwards than 1903 years, or 2234 years before the Christian era. Even this is a remoter antiquity than Ptolemy allows to their science; for he mentions no Chaldean observations prior to the era of Nabonassar, or

Philosophy of the Chaldeans.

(A) The origin usually attributed to the term *philosophy* has been already assigned in the article *PHILOLOGY*. M. Chauvin gives it a turn somewhat different. According to him, the term is derived from *φιλοία*, *desire* or *study*, and *σοφία*, *wisdom*; and therefore he understands the word to mean *the desire or study of wisdom*; for (says he) Pythagoras, conceiving that the application of the human mind ought rather to be called *study* than *science*, set aside the appellation of *wise* as too assuming, and took that of *philosopher*.

(B) Convenit igitur partiri philosophiam in doctrinas tres; doctrinam de numine, doctrinam de naturâ, doctrinam de homine. Quoniam autem partitiones scientiarum non sunt lineis diversis similes, quæ coeunt ad unum angulum; sed potius ramis arborum, qui conjunguntur in uno trunco, qui etiam truncus ad spatium nonnullum integer est et continuus, antequam se partiatur in ramos. *De aug. Scient. lib. iii. cap. i.*

(C) This claim of the Babylonians is thus rejected with contempt by Cicero; "Contemnamus Babylonios, et eos, qui e Caucaſo cœli signa ſervantes, numeris, et motibus, ſtellarum curſus perſequuntur: Condemnemus, inquam, hos aut ſtultitiæ, aut vanitatis, aut imprudentiæ, qui 470 millia annorum, ut ipſi dicunt, monumentis comprehenſa continent, et mentiri judicemus, nec ſecularum reliquorum judicium, quod de ipſis futurum ſit, pertimeſcere. *De Divinatione, lib. i. § 19.*

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† *Apud*
Laert. lib. 1.
§ 8.

§ *Sext.*
Emp. ad
Matth.
lib. 1. § 2
Strabo,
lib. 100.
Cic. de Div.
lib. 1. § 1.

• *Enfield's*
Hist. Phil.
v. 1.

4
Indian
Philosophy

or 747 years before Christ. That they cultivated something which they called philosophy at a much earlier period than this, cannot be questioned; for Aristotle †, on the credit of the most ancient records, speaks of the Chaldean magi as prior to the Egyptian priests, who were certainly men of learning before the time of Moses. For any other science than that of the stars, we do not read that the Chaldeans were famous; and this seems to have been cultivated by them merely as the foundation of judicial astrology. Persuading the multitude that all human affairs are influenced by the stars, and professing to be acquainted with the nature and laws of this influence, their *wise men* pretended to calculate nativities, and to predict good and bad fortune ||. This was the source of idolatry and various superstitions; and whilst the Chaldeans were given up to such dotages, true science could not be much indebted to their labours. If any credit be due to Plutarch and Vitruvius, who quote Berosus, (see BEROSUS), it was the opinion of the Chaldean *wise men* that an eclipse of the moon happens when that part of its body which is destitute of fire is turned towards the earth. "Their cosmogony, as given by Berosus, and preserved by Syncellus, seems to be this, that all things in the beginning consisted of darkness and water; that a divine power dividing this humid mass, formed the world; and that the human mind is an emanation from the Divine nature *.

The large tract of country which comprehended the empires of Assyria and Chaldea, was the first peopled region on earth. From that country, therefore, the rudiments of science must have been propagated in every direction through the rest of the world; but what particular people made the earliest figure, after the Chaldeans, in the history of philosophy, cannot be certainly known. The claim of the Egyptians is probably best founded; but as their science was the immediate source of that of the Greeks, we shall defer what we have to say of it on account of the connection between the parent and the offspring, and turn our attention from Chaldean to Indian philosophy, as it has been cultivated from a very early period by the Brachmans and Gymnosophists. We pass over Persia, because we know not of any science peculiar to that kingdom, except the doctrines of the magi, which were religious rather than philosophical; and of them the reader will find some account under the words MAGI, POLYTHEISM, and ZOROASTER.

From whatever quarter India received its wisdom, we are certain that its philosophers were held in high repute at a period of very remote antiquity, since they were visited by Pythagoras and other sages of ancient Greece, who travelled in pursuit of knowledge.

Yet they seem to have been in that early age, as well as at present, more distinguished for the severity of their manners than for the acquisition of science; and, as Dr Enfield observes, to have more resembled modern monks than ancient philosophers. The brachmans or bramins, it is well known, are all of one tribe; and the most learned of them are in their own language called *Pundits* or *Pandits*. The Greek writers, however, mention a society called *Samaneans*, who, voluntarily devoting themselves to the study of divine wisdom, gave up all private property, committed their children to the care of the state, and their wives to the protection of their relations. This society was supported at the public expence; and its members spent their time in contemplation, in conversation on divine subjects, or in acts of religion.

The philosophy of the Indians has indeed from the beginning been engrafted on their religious dogmas, and seems to be a compound of fanatic metaphysics and extravagant superstition, without the smallest seasoning of rational physics. Very unlike the philosophers of modern Europe, of whom a great part labour to exclude the agency of mind from the universe, the Pandits of Hindostan allow no powers whatever to matter, but introduce the Supreme Being as the immediate cause of every effect, however trivial. "Brehm, the Spirit of God, (says one of their most revered Bramins), is absorbed in self-contemplation. The same is the mighty Lord, who is present in every part of space, whose omnipresence, as expressed in the Reig Beid or Rigveda, I shall now explain. Brehm is one, and to him there is no second; such is truly Brehm. His omniscience is self-inspired or self-intelligent, and its comprehension includes every possible species. To illustrate this as far as I am able; the most comprehensive of all comprehensive faculties is omniscience; and being self-inspired, it is subject to none of the accidents of mortality, *conception, birth, growth, decay, or death*; neither is it subject to passion or vice. To it the three distinctions of time, *past, present, and future*, are not. To it the three modes of being (*ϑ*) are not. It is separated from the universe, and independent of all. This omniscience is named *Brehm*. By this omniscient Spirit the operations of God are enlivened. By this Spirit also the 24 powers (*ε*) of nature are animated. How is this? As the eye by the sun, as the pot by the fire, as iron by the magnet (*φ*), as variety of imitations by the mimic, as fire by the fuel, as the shadow by the man, as dust by the wind, as the arrow by the spring of the bow, and as the shade by the tree; so by this Spirit the world is endued with the powers of intellect, the powers of the will, and the powers of action: so that if

(*ϑ*) To be awake, to sleep, and to be absorbed in a state of unconsciousness—a kind of trance.

(*ε*) The 24 powers of nature, according to the Bramins, are the five elements, *fire, air, earth, water, and akash* (a kind of subtile æther); the five members of action, the *hand, foot, tongue, anus, and male-organ of generation*; the five organs of perception, the *ear, eye, nose, mouth, and skin*; the five senses, which they distinguish from the organs of sensation; the three dispositions of the mind, *desire, passion, and tranquillity*; and the power of *consciousness*.

(*φ*) If the work from which this extract is quoted be of as great antiquity as Mr Halhed supposes, the Bramins must have been acquainted with the phenomena of magnetism at a much earlier period than any other philosophers of whom history makes mention.

History of Philosophy. if it emanates from the heart by the channel of the ear, it causes the perception of sounds; if it emanates from the heart by the channel of the skin, it causes the perception of touch; if it emanates from the heart by the channel of the eye, it causes the perception of visible objects; if it emanates from the heart by the channel of the tongue, it causes the perception of taste; if it emanates from the heart by the channel of the nose, it causes the perception of smell. This also invigorating the five members of action, and invigorating the five members of perception, and invigorating the five elements, and invigorating the five senses, and invigorating the three dispositions of the mind, &c. causes the creation or the annihilation of the universe, while itself beholds every thing as an indifferent spectator *."

* Preliminary Disc. to Halhed's Gen. Lar. 6

Admits not the separate existence of matter, and

From this passage it is plain that all the motions in the universe, and all the perceptions of man, are, according to the Bramins, caused by the immediate agency of the Spirit of God, which seems to be here considered as the soul of the world. But it appears from some papers in the Asiatic Researches, that the most profound of these oriental philosophers, and even the authors of their sacred books, believe not in the existence of matter as a separate substance, but hold an opinion respecting it very similar to that of the celebrated Berkeley. The Védantis (says Sir William Jones), unable to form a distinct idea of brute matter independent of mind, or to conceive that the work of Supreme Goodness was left a moment to itself, imagine that the Deity is ever present to his work, and constantly supports a series of perceptions, which in one sense they call *illusory*, though they cannot but admit the reality of all created forms, as far as the happiness of creatures can be affected by them.

This is the very immaterialism of Berkeley; and in proof that it is the genuine doctrine of the Bramins, the learned president quotes the *Bhāgavat*, which is believed to have been pronounced by the Supreme Being, and in which is the following sentence:

"Except the *first cause*, whatever may appear, and may not appear, in the mind, know that to be the mind's *Māyā*, or "delusion," as light, as darkness."

7 Teaches the metempsychosis.

We have shown elsewhere (see METAPHYSICS, n° 269.) that the metaphysical doctrines of the Bramins, respecting the human soul, differ not from those of Pythagoras and Plato; and that they believe it to be an emanation from the great soul of the world, which, after many transmigrations, will be finally absorbed in its parent substance. In proof of their believing in the metempsychosis, Mr Halhed gives us the following translation of what (he says) is a beautiful stanza in the Gēetā: "As throwing aside his old clothes, a man puts on others that are new; so our lives, quitting the old, go to other newer animals."

8 Physics of the Bramins.

From the Bramins believing in the soul of the world not only as the *sole agent*, but as the *immediate cause* of every motion in nature, we can hardly suppose them to have made any great progress in that science which in Europe is cultivated under the name of *physics*. They have no inducement to investigate the laws of nature; because, according to the first principles of their philosophy, which, together with their religion, they believe to have been revealed from heaven, every phenomenon, however regular, or however anomalous,

History of Philosophy. is produced by the voluntary act of an intelligent mind. Yet if they were acquainted with the use of fire-arms 4000 years ago, as Mr Halhed seems to believe, he who made that discovery must have had a very considerable knowledge of the powers of nature; for though gunpowder may have been discovered by accident in the East, as it certainly was in the West many ages afterwards, it is difficult to conceive how mere accident could have led any man to the invention of a gun. In astronomy, geometry, and chronology too, they appear to have made some proficiency at a very early period. (See ASTRONOMY, n° 4.) Their chronology and astronomy are indeed full of those extravagant fictions which seem to be essential to all their systems; but their calculation of eclipses, and their computations of time, are conducted upon scientific principles.

"It is sufficiently known (says Mr Davis †) that the Hindoo division of the ecliptic into signs, degrees, &c. is the same as ours; that their astronomical year is sidereal, or containing that space of time in which the sun, departing from a star, returns to the same; that it commences on the instant of his entering the sign Aries, or rather the Hindoo constellation Mésa; that each astronomical month contains as many even days and fractional parts as he stays in each sign; and that the civil differs from the astronomical account of time only in rejecting those fractions, and beginning the year and month at sunrise, instead of the intermediate instant of the artificial day or night. Hence arises the unequal portion of time assigned to each month dependent on the situation of the sun's apsis, and the distance of the vernal equinoctial colure from the beginning of Mésa in the Hindoo sphere; and by these means they avoid those errors which Europeans, from a different method of adjusting their calendar by intercalary days, have been subject to."

† Asiatic Researches, vol. ii.

Mr Davis observes, that an explanation of these matters would have led him beyond his purpose, which was only to give a general account of the method by which the Hindoos compute eclipses, and to show that the science of astronomy is as well known among them now as ever it was among their ancestors. This he does very completely; but in the present short historical sketch, we can neither copy nor abridge his memoir. Suffice it to say, that he has shown the practical part of the Hindoo astronomy to be founded on mathematical principles; and that the learned Pandits appear to have truer notions of the form of the earth, and the economy of the universe, than those which are ascribed to their countrymen in general.

The same writer shows likewise, that the prodigious duration which the Hindoos attribute to the world, is the result of a scientific calculation, founded indeed on very whimsical principles. "It has been common with astronomers to fix on some epoch, from which, as from a radix, to compute the planetary motions; and the ancient Hindoos chose that point of time counted back, when, according to their motions as they had determined them, they must have been in conjunction in the beginning of Mésa or Aries, and coeval with which circumstance they supposed the creation. This, as it concerned the planets only, would have produced a moderate term of years compared with the enormous antiquity that will be hereafter stated."

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stated: but having discovered a slow motion of the nodes and apsidæ also, and taken it into the computation, they found it would require a length of time corresponding with 1955884890 years now expired, when they were so situated, and 2364115110 years more before they would return to the same situation again, forming together the grand anomalistic period denominated a *Caipa*, and fancifully assigned as the day of Brahmá."

10
Strange notions of the universe.

But though the mathematical part of the astronomy of the Pandits is undoubtedly respectable, their physical notions of the universe are in the highest degree ridiculous and extravagant. In the Vedas and Puranas, writings of which no devout Hindoo can dispute the divine authority, eclipses are said to be occasioned by the intervention of the monster *Rahu*; and the earth to be supported by a series of animals. "They suppose (says Mr Halhed) that there are 14 spheres, seven below and six above the earth. The seven inferior worlds are said to be altogether inhabited by an infinite variety of serpents, described in every monstrous figure that the imagination can suggest. The first sphere above the earth is the immediate vault of the visible heavens, in which the sun, moon, and stars, are placed. The second is the first paradise, and general receptacle of those who merit a removal from the lower earth. The third and fourth are inhabited by the souls of those men who, by the practice of virtue and dint of prayer, have acquired an extraordinary degree of sanctity. The fifth is the reward of those who have all their lives performed some wonderful act of penance and mortification, or who have died martyrs for their religion. The highest sphere is the residence of Brahma and his particular favourites, such as those men who have never uttered a falsehood during their whole lives, and those women who have voluntarily burned themselves with their husbands. All these are absorbed in the divine essence."

11
Ethics of the Hindoos.* Davis's
Memoir,
Asiatic Researches,
vol. ii.12
Philosophy of the Arabians and Chinese.

On ethics, the Hindoos have nothing that can be called philosophy. Their duties, moral, civil, and religious, are all laid down in their *Vedas* and *Shasters*; and enjoined by what they believe to be divine authority, which supercedes all reasoning concerning their fitness or utility. The business of their Pandits is to interpret those books, which are extremely ancient, and written in a language that has long been unintelligible to every other order of men; but no Pandit will alter the text, however impossible to be reconciled to principles established in his own practice of astronomy. On such occasions, the usual apology for their sacred books is, that "such things may have been so formerly, and may be so still; but that for astronomical purposes, astronomical rules must be followed *." The great duties of morality have been prescribed in every religious code; and they are not overlooked in that of the Hindoos, though the highest merit that a Bramin can have consists in voluntary acts of abstinence and mortification, and in contempt of death.

Of the ancient philosophy of the Arabians and Chinese nothing certain can be said; and the narrow limits of such an abstract as this, do not admit of our mentioning the conjectures of the learned, which contradict each other, and are all equally groundless.

There is indeed sufficient evidence that both nations were at a very early period observers of the stars; and

that the Chinese had even a theory by which they foretold eclipses (see ASTRONOMY, n° 2, 3.); but there is reason to believe that the Arabians, like other people in their circumstances, were nothing more than judicial astrologers, who possessed not the smallest portion of astronomical science.

Pliny makes mention of their magi, whilst later writers tell us, that they were famous for their ingenuity in solving enigmatical questions, and for their skill in the arts of divination: but the authors of Greece are silent concerning their philosophy; and there is not an Arabian book of greater antiquity than the Koran extant. (See PHILOLOGY, Section II.)

Leaving therefore regions so barren of information, let us pass to the Phœnicians, whose commercial celebrity has induced many learned men to allow them great credit for early science. If it be true, as seems highly probable, that the ships of this nation had doubled the Cape and almost encompassed the peninsula of Africa long before the era of Solomon (See OPHIR, n° 10), we cannot doubt but that the Phœnicians had made great proficiency in the art of navigation, and in the science of astronomy, at a period of very remote antiquity. Nor were these the only sciences cultivated by that ancient people: the learned Cudworth has, in our opinion, sufficiently proved that *Moschus* or *Mochus* a Phœnician, who, according to Strabo, flourished before the Trojan war, was the author of the atomic philosophy afterwards adopted by Leucippus, Democritus, and others among the Greeks; and that it was with some of the successors of this sage that Pythagoras, as Jamblichus tells us, conversed at Sidon, and from them received his doctrine of *Monads* (See PYTHAGORAS). Another proof of the early progress of the Phœnicians in philosophy may be found in the fragments of their historian Sanchoniatho which have been preserved by Eusebius†. We are indeed aware that men of great celebrity have called in question the authenticity of those fragments, and even the very existence of such a writer as Sanchoniatho; but for this scepticism we can discover no foundation (See SANCHONIATHO). His history may have been interpolated in some places by the translator Philo-Byblius; but Porphyry, Eusebius, and Theodoret, speak of it as a work of undoubted credit, and affirm that its author flourished before the Trojan war. Now this ancient writer teaches that, according to the *wise men* of his country, all things arose at first from the necessary agency of an active principle upon a passive chaotic mass which he calls *mot*. This chaos Cudworth thinks was the same with the elementary *water* of Thales, who was also of Phœnician extraction; but Mosheim justly observes that it was rather *dark air*, since Philo translates it *αἶρα σκοτεινή*. Be this as it may, nothing can be more evident than that the Phœnicians must have made some progress in what must surely be considered as philosophy, however false, so early as the era of Sanchoniatho; for speculations about the origin of the world never occur to untaught barbarians. Besides Mochus and Sanchoniatho, Cadmus, who introduced letters into Greece, may undoubtedly be reckoned among the Phœnician philosophers; for though it is not pretended that the alphabet was of his invention, and though

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† Prep. Ev.

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though it is by no means certain that the Greeks, at the time of his arrival among them, were wholly destitute of alphabetic characters (See PHILOLOGY, n° 130.); yet the man who could prevail with illiterate savages to adopt the use of strange characters, must have been a great master of the science of human nature. Several other Phœnician philosophers are mentioned by Strabo; but as they flourished at a later period, and philosophised after the systematic mode of the Greeks, they fall not properly under our notice. We pass on therefore to the philosophy of Egypt.

It has been already observed that the Egyptians boasted of being the first of nations, and the authors of all the science which in separate rays illuminated the rest of the world. But though this claim was undoubtedly ill-founded, their high antiquity and early progress in the arts of civil life cannot be controverted. The Greeks with one voice confess that all their learning and wisdom came from Egypt, either imported immediately by their own philosophers, or brought through Phœnicia by the sages of the east; and we know from higher authority than the histories of Greece, that at a period so remote as the birth of Moses, the wisdom of the Egyptians was proverbially famous. Yet the history of Egyptian learning and philosophy, though men of the first eminence both ancient and modern have bestowed much pains in attempts to elucidate it, still remains involved in clouds of uncertainty. That they had some knowledge of physiology, arithmetic, geometry, and astronomy, are facts which cannot be questioned; but there is reason to believe that even these sciences were in Egypt pushed no farther than to the uses of life. That they believed in the existence of incorporeal substances is certain; because Herodotus assures us that they were the first asserters of the immortality, pre-existence, and transmigration of human souls, which they could not have been without holding those souls to be at least *incorporeal*, if not *immaterial*.

The author of Egyptian learning is generally acknowledged to have been *Thoth*, *Theut*, or *Taut*, called by the Greeks *Hermes*, and by the Romans *Mercury*; but of this personage very little is known. Diodorus Siculus says that he was chief minister to Osiris, and that he improved language, invented letters, instituted religious rites, and taught astronomy, music, and other arts. The same thing is affirmed by *Sanchoniatho*, whose antiquity has been already mentioned; by *Manetho* an Egyptian priest, who flourished during the reign of Ptolemy Philadelphus; and by Plato, whose authority, as he resided long in Egypt, and was himself an eminent philosopher, is perhaps more to be depended upon than that of the other two. In the *Philebus* we are told that *Thoth* was the inventor of letters; and lest we should suppose that by those letters nothing more is meant than picture writing or symbolical hieroglyphics, it is added, that he

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distinguished between *vowels* and *consonants*, determining the number of each. The same philosopher, in his *Phædrus*, attributes to *Thoth* the invention of *arithmetic*, *geometry*, *astronomy*, and *hieroglyphic learning*; and subjoins a disputation said to have been held between him and *Thamus* then king of Egypt, concerning the advantage and disadvantage of his newly invented letters. *Thoth* boasted that the invention, by aiding memory, would greatly contribute to the progress of science; whilst the monarch contended, that it would enervate mens natural faculties by making them trust to written characters without exerting the powers of their own minds.

All this, if real, must have happened before the era of Moses; and since it is almost certain that alphabetical characters were in use prior to the *exod* of the Israelites from Egypt (See PHILOLOGY, n° 24, 25.) we may as well allow the invention to *Thoth*, as give it to an earlier author of unknown name. That arithmetic, geometry, and astronomy, were cultivated in Egypt from the most remote antiquity, is affirmed by all the ancients, and made in the highest degree probable by the situation of the country. The first elements of astronomy have certainly been discovered by various nations, whose habits of life led them to the frequent observation of the heavens; and it is observed by Cicero, that the Egyptians and Babylonians, dwelling in open plains where nothing intercepted the view of the heavenly bodies, naturally devoted themselves to the study of that science. The annual overflowing of the Nile, which broke up the boundaries of their lands, would lay the Egyptians under the necessity of adopting some method of settling those boundaries anew; and necessity we know to be the parent of invention. Hence their early acquaintance with practical geometry cannot well be doubted. Their custom of embalming their dead, and the perfection to which they carried that art (c), shows infallibly their knowledge of the properties of natural substances, and gives some reason to believe that they were not altogether strangers to anatomy: but if we allow them to have been at this early period anatomists acquainted with the powers of drugs, we can hardly refuse them some skill in the art of physic, which they themselves traced up to their gods and demigods, to *Serapis*, *Isis*, and her son *Horus* or *Apollo*.

The art of alchymy has been said to have been known by the ancient Egyptians; and from the author of the Egyptian philosophy it has been called the *Hermetic art*. But though this is unquestionably a fiction, there is evidence that they were possessed of one art which is even yet a *desideratum* in the practice of chemistry. "Moses (we are told*) took * *Exod.* the golden calf, which his brother had made for idolatrous purposes, and burnt it in the fire, and ground it to powder, and strowed it on the water, and made the children of Israel drink of it." Had this fact been related by Herodotus or Diodorus Siculus, it would have

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(c) It is true that the dissection of some mummies has lessened the high opinion long entertained of the skill of the ancient Egyptians in the art of embalming; yet it must be granted that their knowledge of antiseptic drugs was great, since it is now certainly known even from these dissections, that by means of such drugs they contrived to preserve rags of cloth from corruption for upwards of 3000 years.

History of Philosophy. have been deemed sufficient evidence that the Egyptians were even at that early period no strangers to the art of chemistry: and surely the evidence should not be the worse for coming from the pen of the Hebrew lawgiver, who was himself educated in the court of Egypt.

¹⁵ Not carried to high perfection. But though it is thus evident that the rudiments of almost every useful science were known in Egypt from the remotest antiquity, it does not appear that any of them was carried to a great degree of perfection, unless perhaps chemistry alone must be excepted. One would think that no science could have been more indispensably requisite to them than geometry. And yet though Pythagoras is said to have spent 22 years in Egypt studying that science and astronomy, he himself discovered (κ) the famous 47th Prop. of Euclid's first book after his return to Samos. This, though a very useful, is yet a simple theorem; and since it was not reached by the Egyptian geometry, we cannot suppose that those people had then advanced far in such speculations. The same conclusion must be drawn with respect to astronomy; for Thales is said to have been the first that calculated an eclipse of the sun; and we nowhere read that the Egyptians pretended to dispute that honour with him. To this it may be replied, that Pythagoras was in Egypt undoubtedly taught the true constitution of the solar system, and what is more extraordinary, the doctrine of comets in particular, and of their revolutions, like the other planets, round the sun (1). We grant that he was taught all this; but it was not scientifically, but dogmatically, as facts which the priests had received by tradition from their early ancestors, and of which they had never questioned the truth nor enquired into the reasons. Of this we need no better proof than that the Pythagorean system of the sun was totally ne-

¹⁶ Their knowledge of the solar system.

glected by the Greeks as soon as they began to frame hypotheses and to speculate in philosophy (κ). History of Philosophy.

But it may seem strange, and certainly is so, that the Egyptian priests, in the days of Pythagoras, should have preserved so great a discovery of their ancestors, and at the same time have totally forgotten the principles and reasoning which led to a conclusion apparently contrary to the evidence of sense. This is a difficulty which we pretend not to remove, though the fact which involves it seems to be beyond the reach of controversy. Perhaps the following observations may throw upon it a feeble light. According to Manetho, the written monuments of the first Thoth were lost or neglected in certain civil revolutions or natural calamities which befel the kingdom of Egypt. After many ages great part of them were recovered by an ingenious interpretation of the symbols which he had inscribed upon ancient columns; and the man who made this interpretation was called the second Thoth or *Hermes Trismegistus*. But *thrice illustrious* as this personage was, it is at least possible that he may have been much inferior to the former Hermes, and have read his writings and transcribed his conclusions without being able to comprehend the principles or reasoning which led to those conclusions. Any man who understands Latin might translate into his own tongue the conclusions of Newton; but much more would be requisite to make him comprehend the demonstrations of his sublime geometry. By what mode of reasoning the first Hermes (1) was led to the true idea of the solar system, or whether it was by reasoning at all, cannot now be known; but it seems very evident, that when the intercourse between the Egyptians and Greeks first commenced, the wisdom of the former people consisted chiefly in the science of legislation and civil policy, and that the philosopher,

(κ) This discovery he claimed; and his claim was admitted by the Greek writers without having been *directly* controverted since. An excellent mathematician, however, has lately shown that the equality between the square of the hypotenuse of a right angled triangle, and the sum of the squares on the other two sides, was known to the astronomers of India at a period long prior to that of Pythagoras. Notwithstanding this, it is certainly possible that the sage of Samos may have made the discovery himself, though we think the contrary much more probable; for we agree with the able writer already mentioned, that Pythagoras, who is generally believed to have conversed with Indian brachmans as well as Egyptian priests, may have derived from them "some of the solid as well as the visionary speculations with which he delighted to instruct or amuse his disciples." See *Transactions of the Royal Society of Edinburgh*, vol. ii. Memoir xiii. Physic Class.

(1) This is recorded by Aristotle and Plutarch; and thus expressed by Ammianus Marcellinus.—"Stellas quasdam, ceteris similes, quarum ortus orbitusque, quibus sint temporibus præstituti humanis mentibus ignorari. Lib. xxv. cap. 10.

(κ) *Fixas* in supremis mundi partibus immotas persistere, et planetas his inferiores circa solem revolvi, terram pariter moveri cursu annuo, diurno vero circa axem propriam, et solem ceu focum universi in omnium centro quiescere, antiquissima fuit philosophantium sententia. Ab Ægyptiis autem astrorum antiquissimis observationibus propagatam esse hanc sententiam verisimile est. Et etiam ab illis et a gentibus conterminis ad Græcos, gentem magis philologicam quam philosophicam, philosophia omnis antiquior juxta et senior manasse videtur. Subinde docuerunt Anaxagoras, Democritus, et alii nonnulli, terram in centro mundi immotam stare, et astra omnia in occasum, aliqua celerius, alia tardius moveri, idque in spatiis liberrimis. Namque orbis solidi postea ab Eudoxo, Calippo, Aristotele, introducti sunt; declinante indies philosophia primitus introducta, et novis Græcorum commentis paulatim prævalentibus. Quibus *vinculis* ANTIQUI planetas in spatiis liberis retineri, deque cursu rectilineo perpetuo retractas in orbem regulariter agi docuere, non constat. *Newton de Mundi Systemate*.

(1) Some authors, deeply skilled in the Hebrew language, have thought that the true system of the sun and planets may be perceived in the Scriptures of the Old Testament, and that it is only from the ignorance or carelessness of the translators that it does not appear in the English bible and other versions. The writer of this article confesses.

History of Philosophy. ¹⁷ Their moral science. ^{Enfield's Hist. of Philosophy.} pper, the divine, the legislator, and the poet, were all united in the same person. Their cosmogony (for all the ancients who pretended to science framed cosmogonies) differed little from that of the Phœnicians already mentioned. They held that the world was produced from chaos by the energy of an intelligent principle; and they likewise conceived that there is in nature a continual tendency towards dissolution. In Plato's *Timæus*, an Egyptian priest is introduced describing the destruction of the world, and asserting that it will be effected by means of water and fire. They conceived that the universe undergoes a periodical conflagration; after which all things are restored to their original form, to pass again through a similar succession of changes.

“Of preceptive doctrine the Egyptians had two kinds, the one sacred, the other vulgar. The former, which respected the ceremonies of religion and the duties of the priests, was doubtless written in the sacred books of Hermes, but was too carefully concealed to pass down to posterity. The latter consisted of maxims and rules of virtue, prudence, or policy. Diodorus Siculus relates many particulars concerning the laws, customs, and manners of the Egyptians; whence it appears that superstition mingled with and corrupted their notions of morals. It is in vain to look for accurate principles of ethics among an ignorant and superstitious people. And that the ancient Egyptians merited this character is sufficiently evident from this single circumstance, that they suffered themselves to be deceived by impostors, particularly by the professors of the fanciful art of astrology; concerning whom Sextus Empiricus justly remarks, that they have done much mischief in the world, by enslaving men to superstition, which will not suffer them to follow the dictates of right reason.” See EGYPT, MYSTERIES, MYTHOLOGY, &c.

¹⁸ Grecian philosophy. From Egypt and Phœnicia philosophy passed into Greece; where it was long taught without system, as in the countries from which it was derived. Phoroneus, Cecrops, Cadmus, and Orpheus, were among the earliest instructors of the Greeks; and they inculcated Egyptian and Phœnician doctrines in detached maxims, and enforced them, not by strength of argument, but by the authority of tradition. Their cosmogonies were wholly Phœnician or Egyptian disguised under Grecian names; and they taught a future state of rewards and punishments. The planets and the moon Orpheus conceived to be habitable worlds, and the stars to be fiery bodies like the sun: but he taught that they are all animated by divinities; an opinion which prevailed both in Egypt and the east: and it does not appear that he gave any other proof of his doctrines than a confident assertion that they were derived from some god. See ORPHEUS.

Hitherto we have seen philosophy in its state of infancy and childhood, consisting only of a collection of sententious maxims and traditionary opinions; but among the Greeks, an ingenious and penetrating people, it soon assumed the form of profound speculation and systematic reasoning. Two eminent philosophers arose nearly at the same period, who may be considered as the parents not only of Grecian science, but of almost all the science which was cultivated in Europe prior to the era of the great Lord Bacon: These were Thales and Pythagoras; of whom the former founded the Ionic school and the latter the Italic: from which two sprung the various sects into which the Greek philosophers were afterwards divided. A bare enumeration of these sects is all that our limits will admit of; and we shall give it in the perspicuous language and just arrangement of Dr Enfield, referring our readers for a fuller account than we can give of their respective merits to his abridged translation of Brucker's history.

Of the IONIC SCHOOL were, 1. The Ionic sect proper, whose founder Thales had as his successors Anaximenes, Anaxagoras, Diogenes Apolloniates, and Archelaus. 2. The Socratic school, founded by Socrates, the principal of whose disciples were Xenophon, Æschines, Simon, Cebes, Aristippus, Phædo, Euclid, Plato, Antisthenes, Critias, and Alcibiades. 3. The Cyrenaic sect, of which Aristippus was the author: his followers were, his daughter Arete, Hegesias, Anicerris, Theodorus, and Bion. 4. The Megaric or Eristic sect, formed by Euclid of Megara; to whom succeeded Eubulides, Diodorus, and Stilpo, famous for their logical subtlety. 5. The Eliac or Eretriac school, raised by Phædo of Elis, who, though he closely adhered to the doctrine of Socrates, gave name to his school. His successors were Plisitanus and Menedemus; the latter of whom, being a native of Eretria, transferred the school and name to his own country. 6. The Academic sect, of which Plato was the founder. After his death, many of his disciples deviating from his doctrine, the school was divided into the old, new, and middle academies. 7. The Peripatetic sect, founded by Aristotle, whose successors in the Lyceum were Theophrastus, Strato, Lycon, Aristio, Critolaus, and Diodorus. Among the Peripatetics, besides those who occupied the chair, were also Dicaearchus, Eudemus, and Demetrius Phalereus. 8. The Cynic sect, of which the author was Antisthenes, whom Diogenes, Onesicritus, Crates, Metrocles, Menipus, and Menedemus, succeeded. In the list of Cynic philosophers must also be reckoned Hipparchia, the wife of Crates. 9. The Stoic sect, of which Zeno was the founder. His successors in the porch were Persæus, Aristo of Chios, Herillus, Sphærus, Cleanthes,

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¹⁹ The Ionic school.

esses that his knowledge of the Hebrew is very limited, which is probably the reason that to him the arguments of these men appear weak and their criticisms fanciful. No man, however, has a higher veneration than he for the sacred volume, which he believes to have been given for nobler purposes than to teach its readers the science of astronomy; but could the principles of that science be found in it, he should be strongly inclined to think that the first Thoth was Joseph, and that the monarch to whom he was minister was the far-famed Osiris. Were there any solid foundation for this supposition it would be easy to conceive how Thoth acquired his science, and how the Egyptian priests might retain just notions of the solar system in general, long after they had forgotten the evidence upon which he communicated those notions to their ancestors.

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school.

Chrysippus, Zeno of Tarsus, Diogenes the Babylonian, Antipater, Panætius, and Posidonius.

Of the ITALIC SCHOOL were, 1. The Italic sect proper: it was founded by Pythagoras, a disciple of Pherecydes. The followers of Pythagoras were Aristæus, Mnesarchus, Alcmaeon, Ecphantus, Hippo, Empedocles, Epicharmus, Ocellus, Timæus, Archytas, Hippasus, Philolaus, and Eudoxus. 2. The Eleatic sect, of which Xenophanes was the author: his successors, Parmenides, Melissus, Zeno, belonged to the metaphysical class of this sect; Leucippus, Democritus, Protagoras, Diagoras, and Anaxarchus, to the physical. 3. The Heraclitean sect, which was founded by Heraclitus, and soon afterwards expired: Zeno and Hippocrates philosophised after the manner of Heraclitus, and other philosophers borrowed freely from his system. 4. The Epicurean sect, a branch of the Eleatic, had Epicurus for its author; among whose followers were Metrodorus, Polyænus, Hermachus, Polystatus, Basilides, and Protarchus. 5. The Pyrrhonic or Sceptic sect, the parent of which was Pyrrho: his doctrine was taught by Timon the Phliasian; and after some interval was continued by Ptolemy a Cyrenean, and at Alexandria by Ænesidemus.

Of the peculiar doctrines of these sects, the reader will in this work find a short account either in the lives of their respective founders, or under the names of the sects themselves. We shall only observe at present, that tho' many of them were undoubtedly absurd, and many wicked, it would yet perhaps be going too far to say with some, that the philosophy of Greece became impious under Diagoras, vicious under Epicurus, HYPOCRITICAL UNDER ZENO, impudent under Diogenes, covetous under Demochares, voluptuous under Metrodorus, fantastical under Crates, scurrilous under Menippus, licentious under Pyrrho, and quarrelsome under Cleanthes. Of the truth of this heavy charge every reader must judge for himself. We are strongly inclined to think, that there were virtues and vices peculiar to each sect; "and that the sects themselves had an affinity more or less direct with the different temperaments of man; whence the choice of sectators often depended on physical influence, or a peculiar disposition of their organs. Nothing appears more natural than that those men who were born with great force of mind and strong nerves should discover a predilection for stoicism; while mortals, endowed by nature with more delicacy of fibres and keener sensibility, fled for refuge to the myrtles of Epicurus. People whose temperaments partook of no extremes, were always inclined either for the Lyceum or the academy. Such as possessed solidity of understanding ranged themselves with Aristotle; and those who had only genius, or even pretensions to that endowment, went to augment the crowd of Platonists."

Pauw's
Philosophical
Dissertations,
&c.

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Grecian
mode of
philosophi-
zing.

* Boeth. in
Prædic. et
Arist. Phy-
sic. lib. i.

All the systematical philosophers, however, pursued their inquiries into nature by nearly the same method. Of their philosophy as well as of ours, the universe, with all that it contains, was the vast object: but the individual things which compose the universe are infinite in number and ever changing; and therefore, according to an established maxim of theirs, incapable of being the subjects of human science*. To reduce this infinitude, and to fix those fleeting beings, they established certain definite arrangements or classes, to

some of which every thing past, present, or to come, might be referred; and having ascertained, as they thought, all that could be affirmed or denied of these classes, they proved, by a very short process of syllogistic reasoning, that what is true of the class must be true of every individual comprehended under it. The most celebrated of these arrangements is that which is known by the name of *categories*; which Mr Harris thinks at least as old as the era of Pythagoras, and to the forming of which mankind would, in his opinion, be necessarily led by the following considerations: Every subject of human thought is either *substance* or *attribute*; but *substance* and *attribute* may each of them be modified under the different characters of *universal* or *particular*. Hence there arises a quadruple arrangement of things into *substance universal* and *substance particular*; into *attribute universal* and *attribute particular*; to some one of which four not only our words and ideas, but every individual of that immense multitude of things which compose the universe, may be reduced. This arrangement, however, the learned author thinks too limited; and he is of opinion, that, by attending to the substances with which they were surrounded, the Grecian schools must soon have distinguished between the attributes *essential* to all substances and those which are only *circumstantial*; between the attributes proper to *natural* substances or bodies and those which are peculiar to *intelligible* substances or minds. He likewise thinks, that the *time* and *place* of the existence of substances not present, must soon have attracted their attention; and that in considering the place of this or that substance, they could hardly avoid thinking of its *position* or *situation*. He is of opinion, that the superinduction of one substance upon another would inevitably suggest the idea of *cloathing* or *habit*, and that the variety of *co-existing* substances and attributes would discover to them another attribute, viz. that of *relation*. Instead therefore of confining themselves to the simple division of *substance* and *attribute*, they divided *attribute* itself into nine distinct sorts, some *essential* and others *circumstantial*; and thus by setting substance at their head, made ten *comprehensive* and *universal* genera, called, with reference to their Greek name, *categories*, and with reference to their Latin name, *predicaments*. These categories are, SUBSTANCE, QUALITY, QUANTITY, RELATION, ACTION, PASSION, WHEN, WHERE, POSITION, and HABIT; which, according to the systematic philosophy of the Greeks, comprehend every human science and every subject of human thought. *History*, natural and civil, springs, says Mr Harris, out of SUBSTANCE; *mathematics* out of QUANTITY; *optics* out of QUALITY and QUANTITY; *medicine* out of the same; *astronomy* out of QUANTITY and MOTION; *music* and *mechanics* out of the same; *painting* out of QUALITY and SITE; *ethics* out of RELATION; *chronology* out of WHEN; *geography* out of WHERE; *electricity*, *magnetism*, and *attraction*, out of ACTION and PASSION; and so in other instances.

To these categories, considered as a mere arrangement of science, we are not inclined to make many objections. The arrangement is certainly not complete: but this is a matter of comparatively small importance; for a complete arrangement of science cannot, we believe, be formed. The greatest objection to the categories arises from the use that was made of them by almost

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gories.

History of almost every philosopher of the Grecian schools; for those sages having reduced the objects of all human science to ten general heads or general terms, instead of setting themselves to inquire by a painful induction into the nature and properties of the real objects before them, employed their time in conceiving what could be predicated of *substance* in general, of this or that *quality*, *quantity*, *relation*, &c. in the abstract: and they soon found, that of such general conceptions as the *categories* there are but five *predicables* or classes of *predicates* in nature. The first class is that in which the *predicate* is the *genus* of the *subject*; the second, that in which it is the *species* of the *subject*; the third, is when the *predicate* is the *specific difference* of the *subject*; the fourth, when it is a *property* of the *subject*; and the fifth, when it is something *accidental* to the *subject* (see *Logic*, Part II. chap. ii. and iii.) Having proceeded thus far in their system, they had nothing to do with individuals but to arrange them under their proper categories, which was commonly done in a very arbitrary manner; and then, with the formality of a syllogism, to predicate of each the predicable of the genus or species to which it belonged. But by this method of proceeding, it is obvious that no progress whatever could be made in physical, metaphysical, or ethical science; for if the individual truly belongs to the category under which it is arranged, we add nothing to our stock of knowledge by affirming or denying of it what we had before affirmed or denied of the whole genus: and if it belong not to the category under which we arrange it, our syllogising will only give the appearance of proof to what must, from the nature of things, be an absolute falsehood. It is only by experiments made on various substances apparently of the same kind that they can be certainly known to belong to the same category; and when this is done, all syllogistic reasoning from the genus to the species, and from the species to the individual, is but solemn trifling, as every proposition in this retrograde course takes for granted the thing to be proved.

Yet this mode of philosophizing spread from Greece almost over the whole world. It was carried by Alexander into Asia, by his successors into Egypt; and it found its way to Rome after Greece became a province of the empire. It was adopted by the Jews, by the fathers of the Christian church, by the Mohammedan Arabs during the caliphate, and continued to be cultivated by the schoolmen through all Europe, till its futility was exposed by Lord Bacon (M). The professors of this philosophy often displayed great acuteness; but their systems were built on mere hypotheses, and supported by syllogistic wrangling. Now and then indeed a superior genius, such as Alhazen and our countryman Roger Bacon, broke through the trammels of the schools, and, regardless of the authority of the Stagyrice and his *categories*, made real discoveries in physical science by experiments judiciously conducted on individual substances (see *BACON (Roger)*; and

OPTICS, n° 6.); but the science in repute still continued to be that of *Generals*.

It was indeed a combination of absurd metaphysics with more absurd theology; and that which is properly called *physics*, had in Europe no place in a liberal education from the end of the eighth century to the end of the fourteenth. Towards the beginning of this period of darkness, the whole circle of instruction, or the liberal arts as they were called, consisted of two branches, the *trivium* and the *quadrivium*; of which the former comprehended *grammar*, *rhetoric*, and *dialectics*; the latter *music*, *arithmetic*, *geometry*, and *astronomy*, to which was added about the end of the eleventh century the study of a number of *metaphysical subtleties* equally useless and unintelligible.

Hitherto the works of the ancient Greek philosophers had been read only in imperfect Latin translations; and before the scholastic system was completely established, Plato and Aristotle had been alternately looked up to as the oracle in science. The rigid schoolmen, however, universally gave the preference to the Stagyrice; because his analysis of body into matter and form is peculiarly calculated to keep in countenance the most incredible doctrine of the Romish church (see *TRANSUBSTANTIATION*): and upon the revival of Greek learning, this preference was continued after the school philosophy had begun to fall into contempt, on account of much useful information contained in some of his writings on subjects of natural history, and his supposed merit as a natural philosopher. At last the intrepid spirit of Luther and his associates set the minds of men free from the tyranny of ancient names, as well in human science as in theology; and many philosophers sprung up in different countries of Europe, who professed either to be *eclectics*, or to study nature, regardless of every authority but that of reason. Of these the most eminent beyond all comparison was Francis Bacon Lord Verulam.

This illustrious man having read with attention the writings of the most celebrated ancients, and made himself master of the sciences which were then cultivated, soon discovered the absurdity of pretending to account for the phenomena of nature by syllogistic reasoning from hypothetical principles; and with a boldness becoming a genius of the first order, undertook to give a new chart of human knowledge. This he did in his two admirable works, intitled, 1. *De dignitate et augmentis scientiarum*; and, 2. *Novum organum scientiarum*, sive *Judicia vera de interpretatione Naturæ*. In the former of these works, he takes a very minute survey of the whole circle of human science, which he divides into three great branches, *history*, *poetry*, and *philosophy*, corresponding to the three faculties of the mind, *memory*, *imagination*, and *reason*. Each of these general heads is subdivided into minuter branches, and reflections are made upon the whole, which, though we can neither copy nor abridge them, will amply reward

(M) *Scientiæ, quas habemus, fere a Græcis fluxerunt. Quæ enim scriptores Romani, aut Arabes, aut recentiores addiderunt, non multa, aut magni momenti sunt: et qualiacunque sint, fundata sunt super basibus eorum quæ inventa sunt a Græcis. Bacon.*

View of
Bacon's
Philosophy.

27
Who esta-
blishes a
better me-
thod of
inquiry.

ward the perusal of the attentive reader. The purpose of the *Novum Organum* is to point out the proper method of interpreting nature; which the author shows can never be done by the logic which was then in fashion, but only by a painful and fair induction. "Homo naturæ minister (says he) et interpres tantum facit et intelligit, quantum de naturæ ordine re, vel mente observaverit; nec amplius scit aut potest. Syllogismus ad principia scientiarum non adhibetur, ad media axiomata frustra adhibetur, cum sit subtilitati naturæ longe impar. Assensum itaque cōstringit, non res. Syllogismus ex propositionibus constat, propositiones ex verbis, verba notionum tesserae sunt. Itaque si notionēs ipsæ (id quod basis rei est) confusæ sint et temere a rebus abstractæ, nihil in iis quæ superstruuntur, est firmitudinis. Itaque spes est una in *inductione vera*."

To hypotheses and preconceived opinions, which he calls *idola theatri*, this great man was not less inimical than to syllogisms; and since his days almost every philosopher of eminence, except Descartes and his followers (see DESCARTES and CARTESIANS), has professed to study nature according to the method of induction so accurately laid down in the *Novum Organum*. On this method a few improvements have perhaps been made; but notwithstanding these, Lord Bacon must undoubtedly be considered as the author of that philosophy which is now cultivated in Europe, and which will continue to be cultivated as long as men shall have more regard for matters of fact than for hypothetical opinions. Of this mode of philosophizing we shall now give a short, though we hope not inaccurate, view, by stating its objects, comparing it with that which it superseded, explaining its rules, and pointing out its uses; and from this view it will appear, that its author shares with Aristotle the empire of science.

28
View of his
Philosophy.

THE universe, that unbounded object of the contemplation, the curiosity and the researches of man, may be considered in two different points of view.

In the first place, it may be considered merely as a collection of existences, related to each other by means of resemblances and distinction, situation, succession, and derivation, as making parts of a whole. In this view it is the subject of pure description.

To acquire an acquaintance with, or a knowledge of, the universe in this point of view, we must enumerate all the beings in it, mention all their sensible qualities, and mark all these relations for each. But this would be labour immense; and when done, an undistinguishable chaos. A book containing every word of a language would only give us the materials, so to speak, of this language. To make it comprehensible, it must be put into some form, which will comprehend the whole in a small compass, and enable the mind to pass easily from one word to another related to it. Of all relations among words, the most obvious are those of resemblance and derivation. An etymological dictionary, therefore, in which words are classed in consequence of their resemblances, and arranged by means of their derivative distinctions, will greatly facilitate the acquisition of the language.

Just so in nature: The objects around us may be grouped by means of their resemblance, and then ar-

ranged in those groups by means of their distinctions and other relations. In this classification we are enabled to proceed by means of our faculty of abstracting our attention from the circumstances in which things differ, and turning it to those only in which they agree. By the judicious employment of this faculty we are able not only to distribute the individuals into classes, but also to distribute those classes into others still more comprehensive, by discovering circumstances of resemblance among them: for the fewer the circumstances are which concur to form that resemblance which has engaged our attention, the greater is the number of dissimilar circumstances which are neglected; and the more extensive will be the class of individuals in which the resemblance is observed. Thus a number of individuals resembling each other in the single circumstance of life, composes the most extensive KINGDOM of ANIMALS. If it be required, that they shall further resemble in the circumstance of having feathers, a prodigious number of animals are excluded, and we form the inferior *class* of BIRDS. We exclude a great number of birds, by requiring a further similarity of web feet, and have the *order* of ANSERES. If we add *lingua citiata*, we confine the attention to the *genus* of ANATES. In this manner may the whole objects of the universe be grouped, and arranged into kingdoms, classes, orders, genera, and species.

Such a classification and arrangement is called NATURAL HISTORY; and must be considered as the only foundation of any extensive knowledge of nature. To the natural historian, therefore, the world is a collection of existences, the subject of descriptive arrangement. His aim is threefold.

1. To observe with care, and describe with accuracy, the various objects of the universe.

2. To determine and enumerate all the great classes of objects; to distribute and arrange them into all their subordinate classes, through all degrees of subordination, till he arrive at what are only accidental varieties, which are susceptible of no farther distribution; and to mark with precision the principles of this distribution and arrangement, and the characteristics of the various assemblages.

3. To determine with certainty the particular group to which any proposed INDIVIDUAL belongs.

DESCRIPTION therefore, ARRANGEMENT, and REFERENCE, constitute the whole of his employment; and in this consists all his science.

Did the universe continue unchanged, this would constitute the whole of our knowledge of nature: but we are witnesses of an uninterrupted succession of changes, and our attention is continually called to the EVENTS which are incessantly happening around us. These form a set of objects vastly more interesting to us than the former; being the sources of almost all the pleasures or pains we receive from external objects.

We are therefore much interested in the study of the events which happen around us, and strongly incited to prosecute it: but they are so numerous and so multifarious, that the study would be immense, without some contrivance for abbreviating and facilitating the task. The same help offers itself here as in the study of what may be called *quiescent nature*. Events, like existences, are susceptible of classification, in consequence of resemblances and distinction; and

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Bacon's
Philosophy.

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Natural
History

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Distin-
guished
from phi-
losophy.

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Bacon's
Philosophy.

by attention to these, we can acquire a very extensive acquaintance with active nature. Our attention must be chiefly directed to those circumstances in which many events resemble each other, while they differ perhaps in a thousand others. Then we must attend to their most general distinctions; then to distinctions of smaller extent, and so on.

It is in this way accordingly that we have advanced in our knowledge of active nature, and are gradually, and by no means slowly, forming assemblages of events more and more extensive, and distributing these with greater and greater precision into their different classes.

In the zealous and attentive prosecution of this task a very remarkable and interesting observation occurs: In describing those circumstances of similarity among events, and particularly in distributing them according to those similarities, it is impossible for us to overlook that constancy which is observed in the changes of nature in the events which are the objects of our contemplation. Events which have once been observed to accompany each other are observed always to do so. The rising of the sun is always accompanied by the light of day, and his setting by the darkness of night. Sound argument is accompanied by conviction, impulse by motion, kindness by a feeling of gratitude, and the perception of good by desire. The unexcepted experience of mankind informs us, that the events of nature go on in certain regular trains; and if sometimes exceptions seem to contradict this general affirmation, more attentive observation never fails to remove the exception. Most of the spontaneous events of nature are very complicated; and it frequently requires great attention and penetration to discover the simple event amidst a croud of unessential circumstances which are at once exhibited to our view. But when we succeed in this discovery, we never fail to acknowledge the perfect uniformity of the event to what has been formerly observed.

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Constancy
in the
changes of
nature

32
Universally
expected.

But this is not all: We firmly believe that this uniformity will still continue; that fire will melt wax, will burn paper, will harden clay, as we have formerly observed it to do; and whenever we have undoubted proofs that the circumstance of situation are precisely the same as in some former case, though but once observed, we expect with irresistible and unshaken confidence that the event will also be the same.

It is not surely necessary to adduce many proofs of the universality of this law of human thought. The whole language and actions of men are instances of the fact. In all languages there is a mode of construction which is used to express this relation as distinct from all others, and the conversation of the most illiterate never confounds them, except when the conceptions themselves are confounded. The general employment of the active and passive verb is regulated by it. *Turris eversa est a militibus; turris eversa est terra motu*, expresses two relations, and no schoolboy will confound them. The distinction therefore is perceived or felt by all who can speak grammatically. Nor is any language without general terms to express this relation, cause—effect—to occasion. Nay, it is a fact in the mind of brutes, who hourly show that they expect the same uses of every subject which they formerly made of it; and without this, animals would be incapable

of subsistence, and man incapable of all improvement. From this alone memory derives all its value; and even the constancy of natural operation would be useless if not matched or adapted to our purposes by this expectation of and confidence in that constancy.

After all the labours of ingenious men to discover the foundation of this irresistible expectation, we must be contented with saying that such is the constitution of the human mind. It is an *universal fact* in human thought; and for any thing that has been yet discovered, it is an *ultimate fact*, not included in any other still more general. We shall soon see that this is sufficient for making it the foundation of true human knowledge; all of which must in like manner be reduced to ultimate facts in human thought.

We must consider this undoubted feeling, this persuasion of the constancy of nature, as an *instinctive* anticipation of events similar to those which we have already experienced. The general analogy of nature should have disposed philosophers to acquiesce in this, however unwelcome to their vanity. In no instance of essential consequence to our safety or well-being are we left to the guidance of our boasted reason; God has given us the surer conduct of natural instincts. No case is so important as this: In none do we so much stand in need of a guide which shall be powerful, infallible, and rapid in its decisions. Without it we must remain incapable of all instruction from experience, and therefore of all improvement.

Our sensations are undoubtedly feelings of our mind. But all those feelings are accompanied by an instinctive reference of them to something distinct from the feelings themselves. Hence arises our perception of external objects, and our very notions of this externity (pardon the term). In like manner, this anticipation of events, this irresistible connection of the idea of fire with the idea of burning, is also a feeling of the mind: and this feeling is by a law of human nature referred, without reasoning, to something external as its cause; and, like our sensation, it is considered as a *sign* of that external something. It is like the conviction of the truth of a mathematical proposition. This is referred by us to something existing in nature, to a necessary and eternal relation subsisting between the ideas which are the subjects of the proposition. The conviction is the sign or indication of this relation by which it is brought to our view. In precisely the same manner, the irresistible connection of ideas is interpreted as the sensation or sign of a *necessary connection* of external things or events. These are supposed to include something in their nature which renders them inseparable companions. To this bond of connection between external things we give the name of CAUSATION. All our knowledge of this relation of cause and effect, is the knowledge or consciousness of what passes in our own minds during the contemplation of the phenomena of nature. If we adhere to this view of it, and put this branch of knowledge on the same footing with those called the *abstract sciences*, considering only the *relations* of ideas, we shall acquire *demonstrative science*. If we take any other view of the matter, we shall be led into inextricable mazes of uncertainty and error.

We see then that the natural procedure of our faculty of abstraction and arrangement, in order to acquire

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Our know-
ledge of
causation.

quire a more speedy and comprehensive knowledge of natural events, presents them to our view in another form. We not only see them as *similar* events, but as events naturally and necessarily *conjoined*. And the expression of *resemblance* among events is also an expression of *concomitancy*; and this arrangement of events in consequence of their resemblance is in fact the *discovery* of those accompaniments. The trains of natural appearance being considered as the appointments of the Author of Nature, has occasioned them to be considered also as consequences of *laws* imposed on his works by their great author, and every thing is said to be regulated by fixed laws. But this is the language of analogy. When a sovereign determines on certain trains of conduct for his subjects, he issues his orders. These orders are laws. He enforces the observance of them by his authority; and thus a certain regularity and constancy of conduct is produced. But should a stranger, ignorant of the promulgation of these laws, and of the exerted authority of the magistrate, observe this uniformity of conduct, he would ascribe it to the genius and disposition of the people; and his observation would be as useful to him for directing the tenor of his own conduct, as the knowledge of the subject himself of the real source of this constancy is for directing his.

Just so in nature, while the theologian pretends, from his discoveries concerning the existence and superintendence of God, to know that the constant accompaniment of events is the consequence of laws which the great Author and Governor of the universe has imposed on his works, the ordinary philosopher, a stranger to this scene, and to the unsearchable operations of the SUPREME MIND, must ascribe this constancy to the nature of the things. There is a great resemblance between the expression *natural law* and *grammatical rule*. Rule in strict language implies command; but in grammar it expresses merely a generality of *fact*, whether of flexion or construction. In like manner, a LAW OF NATURE is to the philosopher nothing but the expression of a generality of fact. A natural or physical law is a generally observed fact; and whenever we treat any subject as a generally observed fact, we treat it physically. It is a physical law of the understanding that argument is accompanied by conviction; it is a physical law of the affection that distress is accompanied by pity; it is a physical law of the material world that impulse is accompanied by motion.

And thus we see that the arrangement of events, or the discovery of those general points of resemblance, is in fact the discovery of the laws of nature; and one of the greatest and most important is, that the laws of nature are constant.

There is no question that this view of the universe is incomparably more interesting and important than that which is taken by the natural historian; contemplating every thing that is of value to us, and, in short, the whole life and movement of the universe. This study, therefore, has been dignified with the name of PHILOSOPHY and of SCIENCE; and natural history has been considered as of importance only in so far as it was conducive to the successful prosecution of philosophy.

But the philosopher claims a superiority on another

account: he considers himself as employed in the discovery of causes, saying that philosophy is the study of the objects of the universe as related by causation, and that it is by the discovery of these relations that he communicates to the world such important knowledge. Philosophy, he says, is the science of causes. The vulgar are contented to consider the prior of two inseparably conjoined events as the cause of the other; the stroke on a bell, for instance, as the cause of sound. But it has been clearly shown by the philosopher, that between the blow on the bell and the sensation of sound there are interposed a long train of events. The blow sets the bell a trembling; this agitates the air in contact with the bell; this agitates the air immediately beyond it; and thus between the bell and the ear may be interposed a numberless series of events, and as many Causes more between the first impression on the ear and that last impression on the nerve by which the mind is affected. He can no longer therefore follow the nomenclature of the vulgar. Which of the events of this train therefore is the cause of the sensation? None of them: It is that *something* which inseparably connects any two of them, and constitutes their bond of union. These bonds of union or causes he considers as residing in one or both of the connected objects: diversities in this respect must therefore constitute the most important distinctions between them. They are therefore with great propriety called the *qualities*, the *properties*, of these respective subjects.

As the events from which we infer the existence of these qualities of things resemble in many respects such events as are the consequences of the exertion of our own powers, these qualities are frequently denominated *POWERS*, *forces*, *energies*. Thus, in the instance just now given of the sound of a bell, we infer the powers of impulse, elasticity, nervous irritability, and animal sensibility.

In consequence of this inference of a necessary connection between the objects around us, we not only infer the posterior event from the prior, or, in common language, the effect from the cause, but we also infer the prior from the posterior, the cause from the effect. We not only expect that the presence of a magnet will be followed by certain motions in iron filings, but when we observe such motions, we infer the presence and agency of a magnet. Joy is inferred from merriment, poison from death, fire from smoke, and impulse from motion. And thus the appearances of the universe are the indications of the powers of the objects in it. Appearances are the language of nature, informing us of their causes. And as all our knowledge of the sentiments of others is derived from our confidence in their veracity; so all our knowledge of nature is derived from our confidence in the constancy of natural operations. A veracity and credulity necessarily resulting from that law of our mental constitution by which we are capable of speech, conduct us in the one case; and the constancy of nature, and the principle of induction, by which we infer general laws from particular facts, conduct us in the other. As human sentiment is inferred from language, and the existence of external things from sensation; so are the laws of nature, and the powers

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of natural objects inferred from the phenomena. It is by the successful study of this language of nature that we derive useful knowledge. The knowledge of the influence of motives on the mind of man enables the statesman to govern kingdoms, and the knowledge of the powers of magnetism enables the mariner to pilot a ship through the pathless ocean.

† Ancient
Metaphy-
sics.

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Discoveries
of Aristotle
and New-
ton com-
pared.

Such are the lofty pretensions of philosophy. It is to be wished that they be well founded; for we may be persuaded that a mistake in this particular will be fatal to the advancement of knowledge. An author of great reputation† gives us an opportunity of deciding this question in the way of experiment. He says that the ancients were philosophers, employed in the discovery of causes, and that the moderns are only natural historians, contenting themselves with observing the laws of nature, but paying no attention to the causes of things. If he speaks of their *professed* aim, we apprehend that the assertion is pretty just in general. With very few exceptions indeed it may be affirmed of his favourite Aristotle, the philosopher *κατ' ἐξοχήν*, and of Sir Isaac Newton. We select these two instances, both because they are set in continual opposition by this author, and because it will be allowed that they were the most eminent students of nature (for we must not yet call them philosophers) in ancient and modern times. Aristotle's professed aim, in his most celebrated writings, is the investigation of causes; and in the opinion of this author, he has been so successful that he has hardly left any employment for his successors beside that of commenting upon his works. We must on the other hand acknowledge that Newton makes no such pretensions, at least in that work which has immortalised his name, and that his professed aim is merely to investigate the *general* laws of the planetary motions, and to apply these to the explanation of particular phenomena. Nor will we say that he has left no employment for succeeding inquirers; but, on the contrary, confess that he has only begun the study, has discovered but one law, and has enabled us to explain only the phenomena comprehended in it alone. But he has not been unsuccessful; his investigation has been complete; and he has discovered beyond all possibility of contradiction a *fact* which is observed through the whole extent of the solar system; namely, that every body, nay that every particle in it, is continually DEFLECTED toward every other body; and that this deflection is, in every instance, proportional to the quantity of matter in that body toward which the deflection is directed, and to the reciprocal of the square of the distance from it. He has therefore discovered a physical law of immense extent. Nor has he been less successful in the explanation of particular phenomena. Of this there cannot be given a better instance than the explanation of the lunar motions from the theory of gravity begun by Newton "Matheſi ſua facem præferente;" and now brought to such a degree of perfection, that if the moon's place be computed from it for any moment within the period of two thousand years back, it will not be found to differ from the place on which she was actually observed by one hundredth part of her own breadth.

*Discimus hinc tandem qua causa argentea Phæbe
Passibus haud æquis eat, et cur, subdita nulli*
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*Hæcenus astronomo, numerorum frena recusat.
Quæ toties animos veterum torſere ſophorum,
Quæque ſcholas hodie rauco certamine vexant,
Obvia conſpicimus, nube pellente matheſi;
Qua ſuperos penetrare domos, et ardua cæli
Newtoni auſpiciis jam dat contingere templa.*

We may now desire the champions of the science of causes to name any one cause which has really been discovered by their great master, whether in the operations of mind or of body. But they must not on this occasion adduce the investigation of any natural law in which he has sometimes succeeded. With still greater confidence may we challenge them to produce any remarkable instance of the explanation of natural phenomena either of mind or body. By explanation, we mean an account of the production, and an appreciation of all the circumstances, susceptible of a scrupulous comparison with fact, and perfectly consistent with it. It is here that the weakness of this philosopher's pretensions is most conspicuous; and his followers candidly acknowledge, that in the enquiries which proceed by experiment, we have not derived great assistance from Aristotle's philosophy. But this, say they, does not derogate from the pre-eminence of his philosophy, because he has shown that the *particular* fields of observation are to be cultivated only by means of experiment. But surely every field of *observation* is particular. There is no *abstract* object of philosophical research, the study of which shall terminate in the philosophy of universals. In every kind of inquiry, that cause alone must be supposed to act which we understand so far as to be able to appreciate its effects in particular circumstances, and compare them with fact, and see their perfect coincidence. If we have discovered causes, they are *known* as far as they are discovered. Their genuine effects are known, and therefore the phenomena which result from their agency are understood. When therefore it is acknowledged, as it must be acknowledged, that mankind have made but little advances in the knowledge of nature, notwithstanding the pretended discovery of causes by Aristotle, and the conducting clue of his philosophy, till of late years; and when it is also allowed that *now*, while we are every day making great additions to this subordinate knowledge, the causes which Aristotle has discovered are forgotten, and his philosophy is neglected; there is great room for suspecting (to say the least), that either the causes which philosophy pretends to have discovered are not real, or that Aristotle and his followers have not aimed at the discovery of causes, but only at the discovery of natural laws, and have failed in the attempt.

There seems here to be a previous question: *Is it possible to discover a philosophical cause, that something which is neither the prior nor the posterior of the two immediately adjoining events, but their bond of union, and this distinct from the union itself?* It is evident that this is an enquiry purely experimental. It is of *human knowledge* we speak. This must depend on the nature of the human mind. This is a matter of contingency, known to us only by experiment and observation. By observing all the feelings and operations of the mind, and classing and arranging them like any other object of science, we discover the general laws of human thought and human reasoning; and this is

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all the knowledge we can ever acquire of it, or of any thing else.

Much has been written on this subject. The most acute observation and sound judgment have been employed in the study; and we may venture to say, that considerable progress has been made in pneumatology. Many laws of human thought have been observed, and very distinctly marked; and philosophers are busily employed, some of them with considerable success, in the distribution of them into subordinate classes, so as to know their comparative extent, and to mark their distinguishing characters with a precision similar to what has been attained in botany and other parts of natural history; so that we may hope that this study will advance like others. But in all these researches, no phenomena have occurred which look like the perception or contemplation of these separate objects of thought, these philosophical causes, this power in abstracto. No philosopher has ever pretended to state such an object of the mind's observation, or attempted to group them into classes.

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In the e-
vents.

We may say at once, without entering into any detail, that those causes, those bonds of necessary union between the naturally conjoined events or objects, are not only perceived *by means* of the events alone, but are perceived solely *in* the events, and cannot be distinguished from the conjunctions themselves. They are neither the objects of separate observation, nor the productions of memory, nor inferences drawn from reflection on the laws by which the operation of our own minds are regulated; nor can they be derived from other perceptions in the way of argumentative inference. We cannot infer the paroxysm of terror from the appearance of impending destruction, nor the fall of a stone when not supported, as we infer the incommensurability of the diagonal and side of a square. This last is *implied* in the very conception or notion of a square; not as a consequence of its other properties, but as one of its essential attributes: and the contrary proposition is not only false, but incapable of being distinctly conceived. This is not the case with the other phenomenon, or any matter of fact. The proofs which are brought of a mathematical proposition, are not the reason of its being true, but the steps by which this truth is brought into our view; and frequently, as in the instance now given, this truth is perceived, not directly, but consequentially, by the inconceivableness of the contrary proposition.

41
Mr Hume's
theory a pe-
nitio princi-
pii.

Mr Hume derives this irresistible expectation of events from the known effect of custom, the association of ideas. The correlated event is brought into the mind by this well known power of custom, with that vivacity of conception which constitutes belief or expectation. But without insisting on the futility of his theory of belief, it is sufficient to observe, that this explanation begs the very thing to be proved, when it ascribes to custom a *power* of any kind. It is the origin of this very power which is the subject in dispute. Besides, on the genuine principles of scepticism, this custom involves an acknowledgement of past events, of a something different from present impressions, which, in this doctrine (if doctrine it can be called), are the only certain existences in nature: and, lastly, it is known that *one* clear experience is a sufficient foundation for this unshaken confidence and

anticipation. General custom can never, on Mr Hume's principles, give superior vivacity to any particular idea.

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This certain nonentity of it as a separate object of observation, and this impossibility to derive this notion of necessary and causal connection between the events of the universe from any source, have induced two of the most acute philosophers of Europe, Mr Leibnitz and Father Malebranche, to deny that there is any such connection, and to assert that the events of the universe go on in corresponding trains, but without any causal connection, just as a well-regulated clock will keep time with the motions of the heavens without any kind of dependence on them. This harmony of events was pre-established by the Author of the Universe, in subserviency to the purposes he had in view in its formation.

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Another
hypothesis
respecting
causal con-
nection.

All those purposes which are cognisable by us, may certainly be accomplished by this perfect adjustment. But without insisting on the fantastic wildness of this ingenious whim, it is quite enough to observe, that it also is a begging of the question, because it supposes causation when it ascribes all to the agency of the Deity.

Thus have we searched every quarter, without being able to find a source from which to derive this perception of a necessary connection among the events of the universe, or of this confident expectation of the continuance of physical laws; and yet we are certain of the feeling, and of the persuasion, be its origin what it may: for we speak intelligibly on this subject; we speak familiarly of cause, effect, power, energy, necessary connection, motives and their influence, argument and conviction, reasons and persuasion, allurements and emotions, of gravity, magnetism, irritability, &c.; and we carry on conversations on these subjects with much entertainment and seeming instruction. Language is the expression of thought, and every word expresses some notion or conception of the mind; therefore it must be allowed, that we have such notions as are expressed by cause, power, energy. But it is here, as in many cases, we perceive a distinction without being able to express it by a definition; and that we do perceive the relation of causation as distinct from all others, and in particular as distinct from the relation of contiguity in time and place; or the relation of agent, action, and patient, must be concluded from the uniformity of language, which never confounds them except on purpose, and when it is perceived. But even here we shall find, that none of the terms used for expressing those powers of substance which are conceived as the causes of their characteristic phenomena, really express any thing different from the phenomena themselves. Let any person try to define the terms gravity, elasticity, sensibility, and the like, and he will find that the definition is nothing but a description of the phenomenon itself. The words are all derivatives, most of them verbal derivatives, implying action, gravitation, &c. As the general resemblances in shape, colour, &c. are expressed by the natural historian by generic terms, so the general resemblances in event are expressed by the philosopher in generic propositions, which, in the progress of cultivation, are also abbreviated into generic terms.

This abundantly explains the consistency of our language on this subject, both with itself and with the

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The per-
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this con-
nection a
first prin-
ciple.

the operations of nature, without however affording any argument for the truth of the assumption, that causes are the objects of philosophic research as separate existences; or that this supposed necessary connection is a *necessary truth*, whether supreme or subordinate. But since the perception of it has its foundation in the constitution of the human mind, it seems intitled to the name of a *first principle*. We are hardly allowed to doubt of this, when we consider the importance of it, and the care of nature to secure us in all things essential to our safety and well-being, from all danger, from inattention, ignorance, or indolence, by an instinct infallible in its information, and instantaneous in its decisions. "It would not be like her usual care (says Hume), if this operation of the mind, by which we infer like effects from like causes, and *vice versa*, were entrusted to the fallacious deduction of our reason, which is slow in its operations, appears not in any degree during the first years of infancy, and in every age and period of human life is extremely liable to error. It is more conformable to her *ordinary caution* (mark the acknowledgment) to secure so necessary an act of the mind by some instinct, or blind tendency, which may be infallible and rapid in all its operations, may discover itself at the first appearance of life, and may be independent of all the laboured deductions of reason. As she has taught us the use of our limbs, without giving us any knowledge of the nerves and muscles by which they are actuated; so she has implanted in us an instinct, which carries forward the thought in a course conformable to that established among external objects, though we be ignorant of the powers and forces on which this regularity depends."

Such a knowledge is quite unnecessary, and therefore causes are no more cognoscible by our intellectual powers than colours by a man born blind: nay, whoever will be at the pains to consider this matter agreeably to the received rules and maxims of logic, will find that necessary connection, or the bond of causation, can no more be the subject of philosophical discussion by man, than the ultimate nature of truth. It is precisely the same absurdity or incongruity, as to propose to examine light with a microscope. Other rational creatures may perceive them as easily as we hear sounds. All that we can say is, that their existence is probable, but by no means certain. Nay, it may be (and we may never know it) that we are not the efficient causes of our own actions, which may be effected by the Deity or by ministering spirits; and this may even be true in the material world. But all this is indifferent to the real occupation of the philosopher, and does not affect either the certainty, the extent, or the utility of the knowledge which he may acquire.

We are now able to appreciate the high pretensions of the philosopher, and his claim to scientific superiority. We now see that this can neither be founded on any scientific superiority of his object, nor of his employment. His object is not causes; and his discoveries are nothing but the discovery of general facts, the discovery of physical laws: and his employment is the same with that of the descriptive historian. He observes and describes with care and accuracy the events of nature; and then he groups them into classes, in consequence of resembling circumstances, detected

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The object
of the phi-
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the disco-
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physical
laws.

in the midst of many others which are dissimilar and occasional. By gradually throwing out more circumstances of resemblance, he renders his classes more extensive; and, by carefully marking those circumstances in which the resemblance is observed, he characterises all the different classes: and, by a comparison of these with each other, in respect to the number of resembling circumstances, he distributes his classes according to their generality and subordination; thus exhausting the whole assemblage, and leaving nothing unarranged but accidental varieties. In this procedure it is to be remarked, that every grouping of similar events is, *ipso facto*, discovering a general fact, a physical law; and the expression of this assemblage is the expression of the physical law. And as every observation of this constancy of fact affords an opportunity for exerting the instinctive inference of natural connection between the related subjects, every such observation is the discovery of a power, property, or quality, of natural substance. And from what has been said, this observation of event is all we know of the connection, all we know of the natural power. And when the philosopher proceeds farther to the arrangement of events, according to their various degrees of complication, he is, *ipso facto*, making an arrangement of all natural powers according to their various degrees of subordinate influence. And thus his occupation is perfectly similar to that of the descriptive historian, classification and arrangement; and this constitutes all the science attainable by both.

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Philosophy.

PHILOSOPHY may therefore be defined, the study of the phenomena of the universe, with a view to discover the general laws which indicate the powers of natural substances, to explain subordinate phenomena, and to improve art: Or, in compliance with that natural instinct so much spoken of, Philosophy is the study of the phenomena of the universe, with a view to discover their causes, to explain subordinate phenomena, and to improve art.

The task is undoubtedly difficult, and will exercise our noblest powers. The employment is manly in itself, and the result of it important. It therefore justly merits the appellation of *philosophy*, although its objects are nowise different from what occupy the attention of other men.

The employment of the philosopher, like that of the natural historian, is threefold; DESCRIPTION, ARRANGEMENT, and REFERENCE; while the objects are not *things* but *events*.

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The em-
ployment
of the phi-
losopher.

The description, when employed about events, may be more properly termed *history*. A philosophical history of nature consists in a complete or copious enumeration and narration of facts, properly selected, cleared of all unnecessary or extraneous circumstances, and accurately narrated. This constitutes the materials of philosophy. We cannot give a better example of this branch of philosophical occupation than astronomy.

From the beginning of the Alexandrian school to this day, astronomers have been at immense pains in observing the heavenly bodies, in order to detect their true motions. This has been a work of prodigious difficulty: for the appearances are such as might have been exhibited although the real motions had been extremely different. Not that our senses give

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Philosophy.

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Phenomenology.

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Investigation.

us false information; but we form hasty, and frequently false judgments, from these informations; and call those things deceptions of sense, which are in fact errors of judgment. But the true motions have at last been discovered, and have been described with such accuracy, that the history may be considered as nearly complete. This is to be found in the usual systems of astronomy, where the tables contain a most accurate and synoptical account of the motion; so that we can tell with precision in what point of the heavens a planet *has been seen* at any instant that can be named.

Sir Isaac Newton's Optics is such another perfect model of philosophical history, as far as it goes. This part of philosophy may be called PHENOMENOLOGY.

Having in this manner obtained the materials of philosophical description, we must put them into a compendious and perspicuous form, so that a general knowledge of the universe may be easily acquired and firmly retained. This is to be done by classification and arrangement, and this classification must proceed on resemblances *observed* in the events; and the subsequent arrangement must be regulated by the distinctions of which those resemblances are still susceptible. This assemblage of events into groups must be expressed. They are facts; therefore the expression must be propositions. These propositions must be what the logicians call *general* or *abstract propositions*; for they express, not any individual fact of the assemblage, but that circumstance in which they all resemble. Such propositions are the following: Proof is accompanied by belief; kindness is accompanied by gratitude; impulse is accompanied by motion. These are usually called *general facts*; but there are none such; every fact is individual. This language, however inaccurate, is very safe from misconstruction, and we may use it without scruple. These propositions are NATURAL OR PHYSICAL LAWS; and then the detecting and marking those resemblances in event, is the investigation of physical laws; and we may denominate this employment of the philosopher INVESTIGATION.

In the prosecution of this task, it will be found that the similarities of fact are of various extent: and thus we shall form physical laws of various extent; and we shall also find that some are subordinate to others; for the resemblance of a number of facts in one circumstance does not hinder a part of them from also resembling in another circumstance: and thus we shall find subordinations of fact in the same way as of quiescent qualities. And it is found here, as in natural history, that our assemblage of resembling events will be the more extensive as the number of resembling circumstances is smaller; and thus we shall have kingdoms, classes, orders, genera, and species of phenomena, which are expressed by physical laws of all those different ranks.

It has been already observed, that this observation of physical laws is always accompanied by a reference of that uniformity of event to a natural bond of union between the concomitant facts which is conceived by us as the *cause* of this concomitancy; and therefore this procedure of the philosopher is considered as the discovery of those causes, that is, the discovery of those powers of natural substances which

constitute their physical relations, and may justly be called their distinguishing *qualities* or *properties*. This view of the matter gives rise to a new nomenclature and language. We give to those powers generic names, such as *sensibility, intelligence, irritability, gravity, elasticity, fluidity, magnetism, &c.* These terms, without exception, mark resembling circumstances of event; and no other definition can be given of them but a description of these circumstances. In a few cases which have been the subjects of more painful or refined discussion, we have proceeded farther in this abbreviation of language.

We have framed the verb "to gravitate," and the verbal noun "gravitation," which purely expresses the fact, the phenomenon; but is conceived to express the *operation* or *energy* of the cause or natural power. It is of importance to keep in mind this metaphysical remark on these terms; for a want of attention to the pure meaning of the words has frequently occasioned very great mistakes in philosophical science.

We may with propriety call this part of the philosopher's employment AITIOLOGY.

We shall give an instance of its most successful application to the class of events already adduced as an example of philosophic history or phenomenology.

Kepler, a celebrated Prussian astronomer, having maturely considered the phenomena recorded in the tables and observations of his predecessors, discovered, amidst all the varieties of the planetary motions, three circumstances of resemblance, which are now known by the name of *Kepler's laws*.

1. All the planets describe ellipses, having the sun in one focus.
2. The elliptic areas described by a planet in the different parts of its orbit, are proportional to the times of description.
3. The squares of the periodic times are proportional to the cubes of the mean distances from the sun.

By this observation or discovery, the study of the planetary motions was greatly promoted, and the calculation of their appearances was now made with a facility and an accuracy which surpassed all hopes: for the calculation of the place of a planet at any proposed instant was reduced to the geometrical problem of cutting off an area from an ellipse of known dimensions, which should bear the same proportion to the whole area, as the time for whose duration the motion is required, has to the known time of a complete revolution.

Long after this discovery of Kepler, Sir Isaac Newton found that these laws of Kepler were only particular cases of a fact or law still more general. He found that the deflections of the planets from uniform rectilinear motion were all directed to the sun; and that the simultaneous deflections were inversely proportional to the squares of the distances from him.

Thus was established a physical law of vast extent: but further observation showed him, that the motion of every body of the solar system was compounded of an original motion of projection, combined with a deflection towards every other body; and that the simultaneous deflections were proportional to the quantity of matter in the body towards which they were directed.

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Aitiology.

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Kepler's
laws an instance.

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Comprehended under one more general law.

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directed, and to the reciprocal of the square of the distance from it. Thus was the law made still more general. He did not stop here. He compared the deflection of the moon in her orbit with the simultaneous deflection of a stone thrown from the hand, and describing a parabola; and he found that they followed the same law, that is, that the deflection of the moon in a second, was to that of the stone in the same time, as the square of the stone's distance from the centre of the earth, to the square of the moon's distance from it. Hence he concluded, that the deflection of a stone from a straight line was just a particular instance of the deflections which took place through the whole solar system.

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Called gra-
vitation.

The deflection of a stone is one of the indications it gives of its being *gravis* or heavy; whence he calls it *gravitation*. He therefore expresses the physical law which obtains through the whole solar system, by saying that "every body *gravitates* to every other body; and the gravitations are proportional to the quantity of matter in that other body, and inversely proportional to the square of the distance from it."

Thus we see how the arrangement of the celestial phenomena terminated in the discovery of physical laws; and that the expression of this arrangement is the law itself.

Since the fall of a heavy body is one instance of the physical law, and since this fall is considered by all as the effect of its *weight*, and this weight is considered as the cause of the fall, the same cause is assigned for all the deflections observed in the solar system; and all the matter in it is found to be under the influence of this cause, or to be heavy; and thus his doctrine has been denominated the *system of universal gravitation*.

Philosophers have gone farther, and have supposed that gravity is a power, property, or quality, residing in all the bodies of the solar system. Sir Isaac Newton does not expressly say so, at least in that work where he gives an account of these discoveries. He contents himself with the immediate consequence of the first axiom in natural philosophy, viz. that every body remains in a state of rest, or of uniform rectilinear motion, unless affected by some moving force. Since the bodies of the solar system are neither in a state of rest, nor of uniform rectilinear motion, they must be considered as so affected; that is, that there operates on every one of them a moving force, directed towards all the others, and having the proportions observed in the deflection.

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Attempts
to include
this law
under im-
pulse.

Other philosophers have endeavoured to show, that this general fact, detected by Sir Isaac Newton, is included in another still more general, viz. that every body moves which is impelled by another body in motion. They assert, that all the bodies of the solar system are continually impelled by a fluid which they call *ether*, which is moving in all places, and in all directions, or in circular vortices, and hurries along with it the planets and all heavy bodies. It would seem that the familiarity of motion produced by impulse, at least in those instances in which our own exertions are most employed, has induced philosophers to adopt such notions; perhaps, too, they are influenced by an obscure and indistinct notion affixed to the term action, as applied to changes in the material world,

and which has given rise to an axiom, "that a body cannot act at a distance, or where it is not;" and thus have thought themselves obliged to look out for an immediate and contiguous agent in all those phenomena.

But the philosophers who profess to be most scrupulous in their adherence to the rules of philosophic discussion, deny the legitimacy of this pretended investigation of causes, saying that this doctrine is in direct opposition to the procedure of the mind in acquiring the knowledge of causes. Since the *fact* of impulse is not really *observed* in the celestial deflections, nor in the motions of heavy bodies, the law cannot be *inferred*. They say that it is not even necessary to show that the phenomena of the celestial motions are unlike the phenomena of impulse, although this can be done in the completest manner. It is enough that neither the fluid nor the impulse are observed; and therefore they are in the right when they assert, that there is inherent in, or accompanies all the bodies of the system, a power by which they deflect to one another. (See OPTICS, n° 66, 67.)

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Whilst im-
pulse itself
is never ob-
served.

The debate is foreign to our present purpose, which is only to show how the observation and arrangement of phenomena terminates in the discovery of their causes, or the discovery of the powers or properties of natural substances.

This is a task of great difficulty, as it is of great importance. There are two chief causes of this difficulty.

1. In most of the spontaneous phenomena of nature there is a complication of many events, and some of them escape our observation. Attending only to the most obvious or remarkable, we conjoin these only in our imagination, and are apt to think these the concomitant events in nature, the proper indication of the cause, and the subjects of this philosophical relation, and to suppose that they are always conjoined by nature. Thus it was thought that there resided in a vibrating chord a power by which the sensation of sound was excited, or that a chord had a sounding quality. But late observations have shown clearly that there is an inconceivable number of events interposed between the vibration of the chord and the sensitive affection of our ear; and therefore, that sound is not the effect of the vibration of the chord, but of the very last event of this series: and this is completely demonstrated by showing that the vibration and the sound are *not necessarily* connected, because they are not *always* connected, but require the interposition of air or of some other elastic body.

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Causes of
the difficul-
ty of philo-
sophical in-
vestigation.

These observations show the necessity of the most accurate and minute observation of the phenomena, that none of those intermediate events may escape us, and we be thus exposed to the chance of imaginary connections between events which are really far asunder in the procedure of nature. As the study has improved, mistakes of this kind have been corrected; and philosophers are careful to make their trains of events under one name as short as possible. Thus, in medicine, a drug is no longer considered as a *specific* remedy for the disease which is sometimes cured when it has been used, but is denominated by its most immediate operation on the animal frame: it is no longer called a *febrifuge*, but a *sudorific*.

2. When

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Bacon's
Philosophy.56
Means of
insuring
success.

2. When many natural powers combine their influence in a spontaneous phenomenon of nature, it is frequently very difficult to discover what part of the complicated effect is the effect of each; and to state those circumstances of similarity which are the foundation of a physical law, or intitle us to infer the agency of any natural power. The most likely method for insuring success in such cases is to get rid of this complication of event, by putting the subject into such a situation that the operation of all the known powers of nature shall be suspended, or so modified as we may perfectly understand their effects. We can thus appreciate the effects of such as we could neither modify nor suspend, or we can discover the existence of a new law, the operation of a new power.

This is called *making an experiment*; and is, of all, the most effectual way of advancing in the knowledge of nature, and has been called EXPERIMENTAL PHILOSOPHY.

57
A seeming
anomaly
explained.

It seems, however, at first sight, in direct opposition to the procedure of nature in forming general laws. These are formed by induction from multitudes of individual facts, and must be affirmed to no greater extent than the induction on which they are founded. Yet it is a matter of fact, a physical law of human thought, that one simple, clear, and unequivocal experiment, gives us the most complete confidence in the truth of a general conclusion from it to every similar case. Whence this anomaly? It is not an anomaly or contradiction of the general maxim of philosophical investigation, but the most refined application of it. There is no law more general than this, that "Nature is constant in all her operations." The judicious and simple form of our experiment insures us (we imagine) in the complete knowledge of all the circumstances of the event. Upon this supposition, and this alone, we consider the experiment as the faithful representative of every possible case of the conjunction. This will be more minutely considered afterwards.

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Theory or
explanation
of subordinate
phenomena.

The last branch of philosophic occupation is the explanation of subordinate phenomena. This is nothing more than the referring any particular phenomenon to that class in which it is included; or, in the language of philosophy, it is the pointing out the general law, or that general fact of which the phenomenon is a particular instance. Thus the feeling of the obligations of virtue is thought to be explained, when it is shown to be a particular case of that regard which every person has for his dearest interests. The rise of water in pumps is explained, when we show it to be a particular case of the pressure of fluids, or of the air. The general law under which we show it to be properly arranged is called the PRINCIPLE of the explanation, and the explanation itself is called the THEORY of the phenomenon. Thus Euler's explanation of the lunar irregularities is called a theory of the lunar motions on the principle of gravitation.

This may be done either in order to advance our own knowledge of nature, or to communicate it to others. If done with the first view, we must examine the phenomenon minutely, and endeavour to detect every circumstance in it, and thus discover all the known laws of nature which concur in its production; we then appreciate the operation of each according to the circumstances of its exertion; we then combine all these, and compare the result with the pheno-

menon. If they are similar, we have explained the phenomenon. We cannot give a better example than Franklin's explanation of the phenomena of thunder and lightning. See LIGHTNING, and ELECTRICITY Index.

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If we explain a phenomenon from known principles, we proceed synthetically from the general law already established and known to exert its influence in the present instance. We state this influence both in kind and degree according to the circumstances of the case; and having combined them, we compare the result with the phenomenon, and show their agreement, and thus it is explained. Thus, because all the bodies of the solar system mutually gravitate, the moon gravitates to the sun as well as to the earth, and is continually, and in a certain determinate manner, deflected from that path which she would describe did she gravitate only to the earth. Her motion round the earth will be retarded during the first and third quarters of her orbit, and accelerated during the second and fourth. Her orbit and her period will be increased during our winter, and diminished during our summer. Her apogee will advance, and her nodes will recede; and the inclination of her orbit will be greatest when the nodes are in syzygy, and least when they are in quadrature. And all these variations will be in certain precise degrees. Then we show that all these things actually obtain in the lunar motions, and they are considered as explained.

This summary account of the object and employment in all philosophical discussion is sufficient for pointing out its place in the circle of the sciences, and will serve to direct us to the proper methods of prosecuting it with success. Events are its object; and they are considered as connected with each other by causation, which may therefore be called the philosophical relation of things. The following may be adopted as the fundamental proposition on which all philosophical discussion proceeds, and under which every philosophical discussion or discovery may be arranged:

"Every change that we observe in the state or condition of things is CONSIDERED BY US as an effect, indicating the agency, characterising the kind, and determining the degree of its INFERRED cause."

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Fundamen-
tal proposi-
tion of phi-
losophical
discussion

As thus enounced, this proposition is evidently a physical law of human thought. It may be enounced as a necessary and independent truth, by saying, every change in the state and condition of things IS AN EFFECT, &c. And accordingly it has been so enounced by Dr Reid*; * *Essays on the Intellectual Powers of Man.* and its title to this denomination has been abundantly supported by him. But we have no occasion to consider it as possessing this quality. We are speaking of philosophy, which is something contingent, depending on the existence and constitution of an intellectual being such as man; and, in conformity to the view which we have endeavoured to give of human knowledge in the subjects of philosophical relation, it is quite sufficient for our purpose that we maintain its title to the rank of an universal law of human thought. This will make it a first principle, even although it may not be a necessary truth.

All the proof necessary for this purpose is universality of fact; and we believe this to be without exception. We are not to expect that all mankind have made,

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or will ever make, a formal declaration of their opinion; but we may venture to say that all have made it, and continually do make it, virtually. What have the philosophers of all ages been employed about but the discovery of the causes of those changes that are incessantly going on? *Nil turpius physico* (says Cicero) *quam fieri sine causâ quidquam dicere*. Human curiosity has been directed to nothing so powerfully and so constantly as to this. Many absurd causes have been assigned for the phenomena of the universe; but no set of men have ever said that they happened without a cause. This is so repugnant to all our propensities and instincts, that even the atheistical sect, who, of all others, would have profited most by the doctrine, have never thought of advancing it. To avoid so shocking an absurdity, they have rather allowed that chance, that the concurrence of atoms, are the causes of the beautiful arrangements of nature. The thoughtless vulgar are no less solicitous than the philosophers to discover the cause of things; and the poet expresses the natural and instinctive passion of all men, when he says,

Felix qui potuit rerum cognoscere causas.

And this anxiety is not to nourish, but to get rid of superstitious fears: for thus

— *metus omnes, et inexorabile fatum*

Subjicit pedibus, strepitumque Acherontis avari.

Had men never speculated, their conduct alone gives sufficient evidence of the universality of the opinion. The whole conduct of man is regulated by it, nay almost wholly proceeds upon it, in the most important matters, and where experience seems to leave us in doubt: and to act otherwise, as if any thing whatever happened without a cause, would be a declaration of insanity. Dr Reid has beautifully illustrated this truth, by observing; that even a child will laugh at you if you try to persuade him that the top, which he misses from the place where he left it, was taken away by nobody. You may persuade him that it was taken away by a fairy or a spirit; but he believes no more about this nobody, than the master of the house when he is told that nobody was the author of any piece of theft or mischief. What opinion would be formed, says Dr Reid, of the intellects of the jurymen, on a trial for murder by persons unknown, who should say that the fractured skull, the watch and money gone, and other like circumstances, might possibly have no cause? he would be pronounced insane or corrupted.

We believe that Mr Hume is the first author who has ventured to call the truth of this opinion in question; and even he does it only in the way of mere possibility. He acknowledges the generality of the opinion; and he only objects to the foundation of this generality: and he objects to it merely because it does not quadrate with his theory of belief; and therefore it may happen that some men may have no such opinion. But it must be observed on this occasion, that the opinion of a philosopher is of no greater weight in a case like this than that of a ploughboy. If it be a first principle, directing the opinions and actions of all, it must operate on the minds of all. The philosopher is the only person who may chance to be without it: for it requires much labour, and long habits refo-

lutely maintained, to warp our natural sentiments; and experience shows us that they may be warped if we are at sufficient pains. It is also worthy of remark, that this philosopher seems as much under the influence of this law as ordinary mortals. It is only when he is aware of its not tallying with his other doctrines that his scruples appear. Observe how he speaks when off his guard: "As to those impressions which arise from the senses, their ultimate cause is, in my opinion, perfectly inexplicable by human reason; and it will always be impossible to decide with certainty whether they arise immediately from the object, are produced by the creative power of the mind, or are derived from the Author of our being."

Among these alternatives he never thought of their not being derived from any cause.

But it is not enough to show that this is a physical law of the human mind: we have assumed it as a first principle, the foundation of a whole science; therefore not included in or derived from any thing more general. Mr Hume's endeavours to show that it is not a necessary truth, show with sufficient evidence that most attempts to derive it in the way of argument are *petitiones principii*; a thing very commonly met with in all attempts to prove first principles. It cannot be proved by induction of facts that every event has a cause, because induction always supposes an *observed fact* or event. Now in by far the greatest number of events the causes are unknown. Perhaps in no event whatever do we know the real cause, or that power or energy which, without any intervention, produces the effect. No man can say, that in the simplest event which he ever observed, he was fully apprised of every circumstance which concurred to its production. We suppose that no event in nature can be adduced more simple than the motion of a suspended glass ball when gently struck by another glass ball; and we imagine that most of our readers will say that he perfectly sees every thing which happens in this phenomenon. We believe, too, that most of our readers are of opinion that a body is never put in motion but by the impulse of another, except in the cases of animal motion; and that they are disposed to imagine that magnets put iron in motion, and that an electrified body moves another by means of an interposed though invisible fluid somehow circulating round them. Now we must inform such readers, that unless the stroke has been very smart, so smart indeed as to shatter the glass balls, the motion of the suspended ball was produced without impulse: that is, the two balls were not in contact during the stroke; and the distance between them was not less than the 9000th part of an inch, and probably much greater. We must say farther, that it is not certain that even the most violent stroke, such as would shatter them to pieces, is enough to bring them into real contact. The proofs of this singular position are too long for this place; but the evidence will be sufficiently seen by consulting the article OPTICS, n° 66, 67.

Unless, therefore, our readers are willing to allow that the suspended ball was put in motion by a repulsive force inherent in one or both balls, they must acknowledge that they do not fully know all the circumstances of this so simple phenomenon, or all the train of events which happen in it; and therefore they are reduced to the necessity of *supposing*, although they do not

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With great
inconsist-
ency.

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This pro-
position as
first prin-
ciple inca-
pable of
proof.

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Contro-
verted by
Mr Hume

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not see it, an intervening fluid or matter, by the immediate action of whose *adjoining* particles the motion is produced.

This being the case in the simplest phenomenon that we can pitch upon, what shall we say of the numberless multitudes which are incomparably more complex? Must we not acknowledge that the efficient causes, even in the vulgar sense of the word, the immediately preceding events, are unknown, because the conjunctions are not observed? and therefore it cannot be said that it is from experimental induction that this truth gains universal belief. Experience, so far from supporting it as a direct proof, seems rather the strongest argument against it; for we have no experiment of unquestionable authority but the narrow circle of our own power exerted on our thoughts and actions. And even here there are perhaps cases of change where we cannot say with certainty that we perceive the efficient cause.

Nothing seems to remain, therefore, but to allow that this physical law of human judgment is instinctive, a constituent of the human soul, a first principle; and incapable of any other proof than the appeal to the feelings of every man.

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Causes not
observed
but inferred
from the
phenomena
which are
the lan-
guage of
nature.

Simply to say, that every change is considered as an effect, is not giving the whole characters of this physical law. The cause is not always, perhaps never, *observed*, but is *inferred* from the phenomena. The inference is therefore in every instance dependant on the phenomenon. The phenomenon is to us the language of nature: It is therefore the sole indication of the cause and of its agency: It is therefore the indication of the very cause, and of no other. The observed change therefore characterises the cause, and marks its kind. This is confirmed by every word of philosophical language, where, as has already been observed, the names of the inferred powers of nature are nothing but either abbreviated descriptions of the phenomena, or terms which are defined solely by such descriptions. In like manner, the phenomenon determines the cause in a *particular degree*, and in no other; and we have no immediate measure of the degree of the cause but the phenomenon itself. We take many measures of the cause, it is true; but on examination they will be found not to be immediate measures of the cause, but of the effect. Assuming gravitation as the cause of the planetary deviations from uniform rectilinear motion, we say that the gravitation of the moon is but $\frac{1}{3600}$ th part of the gravitation of a stone thrown from the hand: but we say this only from observing that the deflection of the stone is 3600 times greater than the simultaneous deflection of the moon. In short, our whole knowledge of the cause is not only *founded* on our knowledge of the phenomenon, but *it is the same*. This will be found a remark of immense consequence in the prosecution of philosophical researches; and a strict attention to it will not only guard us against a thousand mistakes into which the reasoning pride of man would continually lead us, but will also enable us fully to detect many egregious and fatal blunders made in consequence of this philosophical vanity. Nothing can be more evident than that whenever we are puzzled, it would be folly to continue groping among those obscure beings called *causes*, when we have their prototypes, the phenomena themselves, in our hands.

Such is the account which may be given of philosophy, the study of the works of God, as related by causation. It is of vast extent, reaching from an atom to the glorious Author of the Universe, and contemplating the whole connected chain of intelligent, sensitive, and inanimate beings. The philosopher makes use of the descriptions and arrangements of the natural historian as of mighty use to himself in the beginning of his career; confiding in the uniformity of nature; and expecting that similarity in the quiescent properties of things will be accompanied by some resemblances in those more important properties which constitute their mutual dependences, linking them together in a great and endlessly ramified chain of events.

We have endeavoured to ascertain with precision the peculiar province of philosophy, both by means of its object and its mode of procedure. After this it will not require many words to point out the methods for prosecuting the study with expedition and with success. The rules of philosophizing, which Newton premises to his account of the planetary motions, which he so scrupulously followed, and with a success which gives them great authority, are all in strict conformity to the view we have now given of the subject.

The chief rule is, that similar causes are to be assigned to similar phenomena. This is indeed the source of all our knowledge of connected nature; and without it the universe would only present to us an incomprehensible chaos. It is by no means, however, necessary to enjoin this as a maxim for our procedure: it is an instinctive propensity of the human mind. It is absolutely necessary, on the contrary, to caution us in the application of this propensity. We must be extremely confident in the certainty of the resemblance before we venture to make any inference. We are prone to reason from analogy: the very employment is agreeable; and we are ever disposed to embrace opportunities of engaging in it. For this reason we are satisfied with very slight resemblances, and eagerly run over the consequences, as if the resemblances were complete; and our researches frequently terminate in falsehood.

This propensity to analogical reasoning is aided by another equally strong, and equally useful, when properly directed; we mean the propensity to form general laws: it is in fact a propensity to discover *causes*, which is equivalent to the establishing of general laws. It appears in another form, and is called a love of or taste for simplicity; and this is encouraged or justified as agreeable to the uniformity and simplicity of nature. "Natura semper sibi similis et consona," says Newton; "Frustra fit per plura, quod fieri potest per pauciora," says another. The beautiful, the wise economy of nature, are phrases in every body's mouth; and Newton enjoins us to adopt no more causes than are sufficient to explain the phenomena. All this is very well, and is true in its own degree; but it is too frequently the subterfuge of human vanity and self-love. This inordinate admiration of the economy and simplicity of nature is generally conjoined with a manifest love of system, and with the actual production of some new system, where from one general principle some extensive theory or explanation is deduced and offered to the world. The author sees a sort of resemblance

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blance between a certain series of phenomena and the consequences of some principle, and thinks the principle adequate to their explanation. Then, on the authority of the acknowledged simplicity of nature, he roundly excludes all other principles of explanation; because, says he, this principle is sufficient "et frustra fit per plura," &c. We could point out many instances of this kind in the writings of perhaps the first mathematician and the poorest philosopher of this century; where extensive theories are thus cavalierly exhibited, which a few years examination have shown to be nothing but analogies, indistinctly observed, and, what is worse, inaccurately applied.

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To regulate these hazardous propensities, and keep philosophers in the right path, Newton inculcates another rule, or rather gives a modification of this injunction of simplicity. He enjoins, that no cause shall be admitted but what is real. His words are, that *no causes shall be admitted but such as are true, and sufficient to account for the phenomena.* We apprehend that the meaning of this rule has been mistaken by many philosophers, who imagine that by *true* he means causes which really exist in nature, and are not mere creatures of the imagination. We have met with some who would boggle at the doctrines of Aristotle respecting the planetary motions, *viz.* that they are carried along by conducting intelligent minds, because we know of *none such* in the universe; and who would nevertheless think the doctrine of the Cartesian vortices deserving of at least an examination, because we see such vortices exist, and produce effects which have some resemblance to the planetary motions, and have justly rejected them, *solely* because this resemblance has been very imperfect. We apprehend Newton's meaning by these words is, that no cause of any event shall be admitted, or even considered, which we *do not know* to be actually concurring or exerting some influence in *that very event.* If this be his meaning, he would reject the Cartesian vortices, and the conducting spirits of Aristotle for one and the same reason; not because they were not adequate to the explanation, nor because such causes did not exist in nature, but because we did *not see them* anyhow concerned in the phenomenon under consideration. We neither see a spirit nor a vortex, and therefore need not trouble ourselves with enquiring what effects they would produce. Now we know that this was his very conduct, and what has distinguished him from all philosophers who preceded him, though many, by following his example, have also been rewarded by similar success. This has procured to Newton the character of the *modest* philosopher; and modest his procedure may, for distinction's sake, be called, because the contrary procedure of others did not originate so much from ignorance as from vanity. Newton's conductor in this was not modesty, but sagacity, prudence, caution, and to say it purely, it was sound judgment.

For the bonds of nature, the supposed philosophical causes are not *observed*; they are *inferred* from the phenomena. When two substances are observed, and only when they are observed, to be connected in any series of events, we *infer* that they are connected by a natural power: but when one of the substances is not seen, but fancied, no law of human thought produces any inference whatever. For this reason alone New-

ton stopped short at the last fact which he could discover in the solar system, that all bodies were deflected to all other bodies, according to certain regulations of distance and quantity of matter. When told that he had done nothing in philosophy, that he had discovered no cause, and that to merit any praise he must show how this deflection was produced;—he said, that he knew no more than he had told them; that he saw nothing causing this deflection; and was contented with having described it so exactly, that a good mathematician could now make tables of the planetary motions as accurate as he pleased, and with hoping in a few years to have every purpose of navigation and of philosophical curiosity completely answered; and he was not disappointed. And when philosophers on all sides were contriving hypothetical fluids and vortices which would produce these deflections, he contented himself with showing the total inconsistency of these explanations with the mechanical principles acknowledged by their authors; showing that they had transgressed both parts of his rule, their causes neither being real nor sufficient for explaining the phenomena. A cause is sufficient for explaining a phenomenon only when its legitimate consequences are perfectly agreeable to these phenomena.

Newton's discoveries remain without any diminution or change: no philosopher has yet advanced a step further.

But let not the authority, or even the success, of Newton be our guide. Is his rule founded in reason? It surely is. For if philosophy be only the interpretation of nature's language, the inference of causes from the phenomena, a fancied or hypothetical phenomenon can produce nothing but a fanciful cause, and can make no addition to our knowledge of real nature.

All hypotheses therefore must be banished from philosophical discussion as frivolous and useless, administering to vanity alone. As the explanation of any appearance is nothing but the pointing out the general fact, of which this is a particular instance, a hypothesis can give no explanation: knowing nothing of cause and effect but the conjunction of two events, we see nothing of causation where one of the events is hypothetical. Although all the legitimate consequences of a hypothetical principle should be perfectly similar to the phenomenon, it is extremely dangerous to assume this principle as the real cause. It is illogical to make use of the economy of nature as an argument for the truth of any hypothesis: for if true, it is a physical truth, a matter of fact, and true only to the extent in which it is observed, and we are not intitled to say that it is so one step farther; therefore not in *this case till it be observed.* But the proposition that nature is so economical is false; and it is astonishing that it has been so lazily acquiesced in by the readers of hypotheses: for it is not the authors who are deceived by it, they are generally led by their own vanity. Nothing is more observable than the prodigious variety of nature. That the same phenomena may be produced by different means is well known to the astronomers, who must all grant, that the appearances of motion will be precisely the same whether the earth moves round the sun like the other planets, or whether the sun with his attendant planets moves round the earth; and that

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the demonstration of the first opinion is had from a fact totally unconnected with all the deflections or even with their causes: for it may be asserted, that Dr Bradley's discovery of the aberration of the fixed stars, in consequence of the progressive motion of light, was the first thing which put the Copernican system beyond question; and even this is still capable of being explained in another way. The Author of Nature seems to delight in variety; and there cannot be named a single purpose in which the most inconceivable fertility in resource is not observed. It is the most delightful occupation of the curious mind and the sensible heart to contemplate the various contrivances of nature in accomplishing similar ends.

As a principle therefore on which to found any maxim of philosophical procedure, this is not only injudicious, because imprudent and apt to mislead, but as false, and almost sure to mislead. In conformity to this observation, it must be added, that nothing has done so much harm in philosophy as the introduction of hypotheses.

Authors have commonly been satisfied with very slight resemblances, and readers are easily misled by the appearances of reasoning which these resemblances have countenanced. The ancients, and above all Aristotle, were much given to this mode of explanation, and have filled philosophy with absurdities. The slightest resemblances were with them sufficient foundations of theories. It has been by very slow degrees that men have learned caution in this respect; and we are sorry to say that we are not yet cured of the disease of hypothetical systematizing, and to see attempts made by ingenious men to bring the frivolous theories of antiquity again into credit. Nay, modern philosophers even of the greatest name are by no means exempted from the reproach of hypothetical theories. Their writings abound in ethers, nervous fluids, animal spirits, vortices, vibrations, and other invisible agents. We may affirm that all these attempts may be shown to be either unintelligible, fruitless, or false. Either the hypothesis has been such that no consequence can be distinctly drawn from it, on account of its obscurity and total want of resemblance to any thing we know; or the just and legitimate consequences of the hypothesis are inconsistent with the phenomena (N). This is remarkably the case in the hypotheses which have been introduced for the explanation of the mechanical

phenomena of the universe. These can be examined by accurate science, and the consequences compared without any mistake; and nothing else but a perfect agreement should induce us even to listen to any hypothesis whatever.

It may here be asked, Whether, in the case of the most perfect agreement, after the most extensive comparison, the hypothesis should be admitted? We believe that this must be left to the feelings of the mind. When the belief is irresistible, we can reason no more. But as there is no impossibility of as perfect an agreement with some other hypothesis, it is evident that it does not convey an irrefragable title to our hypothesis. It is said, that such an agreement authorises the reception of the hypothetical theory in the same manner as we *must* admit that to be the *true* cypher of a letter which will make perfect sense of it. But this is not true: in decyphering a letter we know the sounds which *must* be represented by the characters, and that they are really the constituents of speech: but in hypothetical explanations the first principle is not known to exist; nay, it is possible to make two cyphers, each of which shall give a meaning to the letter. Instances of this are to be seen in treatises on the art of decyphering; and there has been lately discovered a national character (the *ogam* discovered in Ireland) which has this property.

We conclude our criticism on hypothetical explanations with this observation, that it is *impossible* that they can give any addition of knowledge. In every hypothesis we thrust in an intermediate event between the phenomenon and some general law; and this event is not seen, but supposed. Therefore, according to the true maxims of philosophical investigation, we give no explanation; for we are not by this means enabled to assign the general law in which this particular phenomenon is included: nay, the hypothesis makes no addition to our list of general laws; for our hypotheses must be *selected*, in order to tally with all the phenomena. The hypothesis therefore is understood only *by* and *in* the phenomena; and it must not be made more general than the phenomena themselves. The hypothesis gives no generalisation of facts. Its very application is founded on a great coincidence of facts; and the hypothetical fact is thrust in between two which we really observe to be united by nature. The applicability therefore of the hypothesis is not more

(N) It has often been matter of amusement to us to examine the hypothetical theories of ingenious men, and to observe the power of nature even when we are transgressing her commands, *Naturam expellat furca, tamen usque revertitur*. The hypothesis of an ingenious man is framed in perfect conformity to nature's dictates: for you will find that the hypothetical cause is touched and retouched, like the first sitting of a picture, till it is made to resemble the phenomena, and the cause is still inferred, nay explained, in spite of all his ingenuity, from the phenomenon; and then, instead of desiring the spectators to pay him his due praise, by saying that the picture is like the man, he insists that they shall say, what gives him no credit, that the man is like the picture. But, alas! this is seldom the case: The picture is generally an anamorphosis, unlike any thing extant in nature, and having parts totally incongruous. We have seen such pictures, where a wood is standing on the sea, and an eye is on the end of an elephant's trunk; and yet when this was viewed through a proper glass, the wood became an eyebrow to the eye, and the proboscis was a very pretty ringlet of hair. We beg indulgence for this piece of levity, because it is a most apposite illustration of a hypothetical theory. The resemblance between the principle and phenomenon is true only in detached unconnected scraps, and the principle itself is an incongruous patchwork. But by a perversion of the rules of logic, all these inconsistencies are put out of view, and the explanation is something like the phenomenon.

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extensive than the similarity of facts which we observe, and the hypothetical law is not more general than the observed law. Let us then throw away entirely the hypothetical law, and insert the observed one in our list of general laws: it will be in different language from the hypothetical law, but it will express the same facts in nature.

It is in experimental philosophy alone that hypotheses can have any just claim to admission; and here they are not admitted as explanations, but as conjectures serving to direct our line of experiments.

Effects only appear; and by their appearance, and the previous information of experience, causes are immediately ascertained by the perfect similarity of the whole train of events to other trains formerly observed: Or they are suggested by more imperfect resemblances of the phenomena; and these suggestions are made with stronger or fainter evidence, according as the resemblance is more or less perfect. These suggestions do not amount to a confidential inference, and only raise a conjecture. Wishing to verify or overturn this conjecture, we have recourse to experiment; and we put the subject under consideration in such a situation, that we can say what will be the effect of the conjectural cause if real. If this tallies with the appearance, our conjecture has more probability of truth, and we vary the situation, which will produce a new set of effects of the conjectured cause, and so on. It is evident that the probability of our conjecture will increase with the increase of the conformity of the legitimate effects of the supposed cause with the phenomena, and that it will be entirely destroyed by one disagreement. In this way conjectures have their great use, and are the ordinary means by which experimental philosophy is improved. But conjectural systems are worse than nonsense, filling the mind with false notions of nature, and generally leading us into a course of improper conduct when they become principles of action. This is acknowledged even by the abettors of hypothetical systems themselves, when employed in overturning those of their predecessors, and establishing their own: witness the successive maintainers of the many hypothetical systems in medicine, which have had their short-lived course within these two last centuries.

Let every person therefore who calls himself a philosopher resolutely determine to reject all temptations to this kind of system-making, and let him never consider any composition of this kind as any thing better than the amusement of an idle hour.

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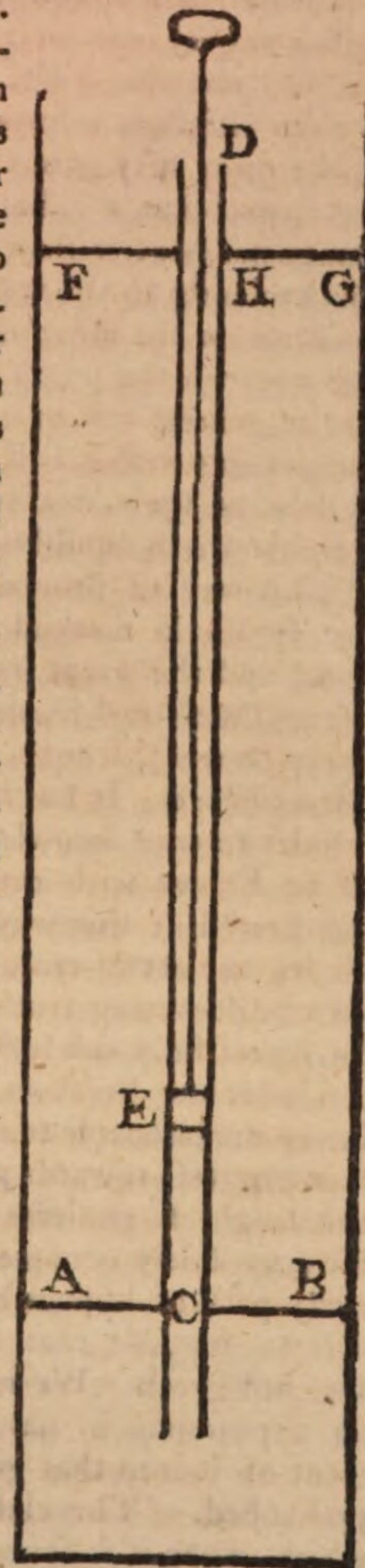
After these observations, it cannot require much discussion to mark the mode of procedure which will insure progress in all philosophical investigations.

The sphere of our intuitive knowledge is very limited; and we must be indebted for the greatest part of our intellectual attainments to our rational powers, and it must be deductive. In the spontaneous phenomena of nature, whether of mind or body, it seldom happens that the energy of that natural power, which is the principle of explanation, is so immediately connected with the phenomenon that we see the connection at once. Its exertions are frequently concealed, and in all cases modified, by the joint exertions of other natural powers: the particular exertion of each must be considered apart, and their mutual connection traced out. It is only in this way that we can

discover the perhaps long train of intermediate operations, and also see in what manner and degree the real principle of explanation concurs in the ostensible process of nature.

In all such cases it is evident that our investigation (and investigation it most strictly is) must proceed by steps, conducted by the sure hand of logical method. To take an instance from the material world, let us listen to Galileo while he is teaching his friends the cause of the rise of water in a pump. He says that it is owing to the pressure of the air. This is his principle; and he announces it in all its extent. All matter, says he, is heavy, and in particular air is heavy. He then points out the connection of this general principle with the phenomenon.

Air being heavy, it must be supported: it must lie and press on what supports it: it must press on the surface AB of the water in the cistern surrounding the pipe CD of the pump; and also on the water C within this pipe. He then takes notice of another general principle which exerts its subordinate influence in this process. Water is a fluid; a fluid is a body whose parts yield to the smallest impression; and, by yielding, are easily moved among themselves: and no little parcel of the fluid can remain at rest unless it be equally pressed in every direction, but will recede from that side where it sustains the greatest pressure. In consequence of this fluidity, known to be a property of water, if any part of it is pressed, the pressure is propagated thro' the whole; and if not resisted on every side, the water will move to that side where the propagated pressure is not resisted. All these subordinate or collateral propositions are supposed to be previously demonstrated or allowed. Water therefore must yield to the pressure of the air unless pressed by it on every side, and must move to that side where it is not withheld by some opposite pressure. He then



proceeds to show, from the structure of the pump, that there is no opposing pressure on the water in the inside of the pump. "For (says he) suppose the piston thrust down till it touches the surface of the water in the pipe; suppose the piston now drawn up by a power sufficient to lift it, and all the air incumbent on it; and suppose it drawn up a foot or a fathom—there remains nothing now (says he) that I know of, to press on the surface of the water. In short (says he), gentlemen, it appears to me, that the water in the pump is in the same situation that it would be in were there no air at all, but water poured into the cistern to a height AF; such, that the column of water FABG presses

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presses on the surface AB as much as the air does. Now in this case we know that the water at C is pressed upwards with a force equal to the weight of a column of water, having the section of the pipe for its base and CH for its height. The water below C therefore will be pressed up into the pipe CD, and will rise to G, so that it is on a level with the external water FG; that is, it will rise to H. This is a necessary consequence of the weight and pressure of the incumbent column FABG, and the fluidity of the water in the cistern. Consequences perfectly similar must necessarily follow from the weight and pressure of the air; and therefore on drawing up the piston from the surface C of the water, with which it was in contact, the water must follow it till it attain that height which will make its own weight a balance for the pressure of the circumambient air. Accordingly, gentlemen, the Italian plumbers inform me, that a pump will not raise water quite fifty palms; and from their information I conclude, that a pillar of water fifty palms high is somewhat heavier than a pillar of air of the same base, and reaching to the top of the atmosphere."

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Thus is the phenomenon explained. The rise of the water in the pump is shown to be a particular case of the general fact in hydrostatics, that fluids in communicating vessels will stand at heights which are inversely as their densities, or that columns of equal weights are in equilibrio.

This way of proceeding is called arguing *a priori*, the synthetic method. It is founded on just principles; and the great progress which we have made in the mathematical sciences by this mode of reasoning shows to what length it may be carried with irresistible evidence. It has long been considered as the only inlet to true knowledge; and nothing was allowed to be known with certainty which could not be demonstrated in this way to be true. Accordingly logic, or the art of reasoning, which was also called the art of discovering truth, was nothing but a set of rules for successfully conducting this mode of argument.

Under the direction of this infallible guide, it is not surely unreasonable to expect that philosophy has made sure progress towards perfection; and as we know that the brightest geniuses of Athens and of Rome were for ages solely occupied in philosophical researches in every path of human knowledge, it is equally reasonable to suppose that the progress has not only been sure but great. We have seen that the explanation of an appearance in nature is nothing but the arrangement of it into that general class in which it is comprehended. The class has its distinguishing mark, which, when it is found in the phenomenon under consideration, fixes it in its class, there to remain for ever an addition to our stock of knowledge. Nothing can be lost any other way but by forgetting it; and the doctrines of philosophers must be stable like the laws of nature.

We have seen, however, that the very reverse of all this is the case; that philosophy has but very lately emerged from worse than total darkness and ignorance; that what passed under the name of philosophy was nothing but systems of errors (if systems they could be called), which were termed doctrines, delivered with the most imposing apparatus of logical demonstration, but belied in almost every instance by experience, and

affording us no assistance in the application of the powers of nature to the purposes of life. Nor will this excite much wonder in the mind of the enlightened reader of the present day, who reflects on the use that in this dialectic process was made of the *categories*, and the method in which those categories were formed. From first principles so vague in themselves, and so gratuitously assumed, ingenious men might deduce many different conclusions all equally erroneous: and that this was actually done, no surer evidence can be given, than that hardly a lifetime elapsed in which the whole system of doctrines which had captivated the minds of the most penetrating, have been oftener than once exploded and overturned by another system, which flourished for a while, and then was supplanted by a third which shared the same fate. Here was an infallible proof of their error, for instability is incompatible with truth.

It is allowed by all that this has been the case in those branches of study at least which contemplate the philosophical relations of the material world, in astronomy, in mechanical philosophy, in chemistry, in physiology, in medicine, in agriculture. It is also acknowledged, that in the course of less than two centuries back we have acquired much knowledge on these very subjects, call it philosophy, or by what name you will, so much more conformable to the natural course of things, that the deductions made from it by the same rules of the synthetic method are more conformable to fact, and therefore better fitted to direct our conduct and improve our powers. It is also certain that these bodies of doctrine which go by the name of philosophical systems, have much more stability than in ancient times; and though sometimes in part superseded, are seldom or never wholly exploded.

This cannot perhaps be affirmed with equal confidence with respect to those speculations which have our intellect or propensities for their object: and we have not perhaps attained such a representation of human nature as will bear comparison with the original; nor will the legitimate deductions from such doctrines be of much more service to us for directing our conduct than those of ancient times: and while we observe this difference between these two general classes of speculations, we may remark, that it is conjoined with a difference in the manner of conducting the study. We have proceeded in the old Aristotelian method when investigating the nature of mind; but we see the material philosophers running about, passing much of their time away from books in the shop of the artisan, or in the open fields engaged in observation, labouring with their hands, and busy with experiments. But the speculatist on the intellect and the active powers of the human soul seems unwilling to be indebted to any thing but his own ingenuity, and his labours are confined to the closet. In the first class, we have met with something like success, and we have improved many arts: in the other, it is to be feared that we are not much wiser, or better, or happier, for all our philosophic attainments.

Here, therefore, must surely have been some great, some fatal mistake. There has indeed been a material defect in our mode of procedure, in the employment of this method of reasoning as an inlet to truth. The

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fact is, that philosophers have totally mistaken the road of discovery, and have pretended to set out in their investigation from the very point where this journey should have terminated.

The Aristotelian logic, the syllogistic art, that art so much boasted of as the only inlet to true knowledge, the only means of discovery, is in direct opposition to the ordinary procedure of nature, by which we every day, and in every action of our lives, acquire knowledge and discover truth. It is not the art of discovering truth, it is the art of communicating knowledge, and of detecting error: it is nothing more than the application of this maxim, "whatever is true of a whole class of objects, is true of each individual of that class." This is not a just account of the art of discovering truth, nor is it a complete account of the art of reasoning. Reasoning is the producing belief; and whatever mode of argumentation invariably and irresistibly produces belief, is reasoning. The ancient logic supposes that all the first principles are already known, and that nothing is wanted but the application of them to particular facts. But were this true, the application of them, as we have already observed, can hardly be called a discovery: but it is not true; and the fact is, that the first principles are generally the chief objects of our research, and that they have come into view only now and then as it were by accident, and never by the labour of the logician. He indeed can tell us whether we have been mistaken; for if our general principle be true, it must influence every particular case. If, therefore, it be false in any one of these, it is not a true principle. And it is here that we discover the source of that fluctuation which is so much complained of in philosophy. The authors of systems give a set of consecutive propositions logically deduced from a first principle, which has been hastily adopted, and has no foundation in nature. This does not hinder the amusement of framing a system from it, nor this system from pleasing by its symmetry; and it takes a run: but when some officious follower thinks of making some use of it, which requires the comparison with experience and observation, they are found totally unlike, and the whole fabric must be abandoned as unsound: and thus the successive systems were continually pushing out their predecessors, and presently met with the same treatment.

How was this to be remedied? The ratiocination was seldom egregiously wrong; the syllogistic art had ere now attained a degree of perfection which left little room for improvement, and was so familiarly understood by the philosophical practitioners, that they seldom committed any great blunders. Must we examine the first principles? This was a task quite new in science; and there were hardly any rules in the received systems of logic to direct us to the successful performance of it. Aristotle, the sagacious inventor of those rules, had not totally omitted it; but in the fervour of philosophic speculation he had made little use of them. His fertile genius never was at a loss for first principles, which answered the purpose of verbal disquisition without much risk of being belied on account of its dissimilitude to nature; for there was frequently no prototype with which his systematic doctrine could be compared. His enthusiastic followers

found abundant amusement in following his example; and philosophy, no longer in the hands of men acquainted with the world, conversant in the great book of nature, was now confined almost entirely to recluse monks, equally ignorant of men and of things. But curiosity was awakened, and the men of genius were fretted as well as disgusted with the disquisitions of the schools, which one moment raised expectations by the symmetry of composition, and the next moment blasted them by their inconsistency with experience.

They saw that the best way was to begin *de novo*, to throw away the first principles altogether, without exception or examination, and endeavour to find out new ones, which should stand the test of logic; that is, should in every case be agreeable to fact.

Philosophers began to reflect, that under the untutored tuition of kind nature we have acquired much useful knowledge. It is therefore highly probable, that her method is the most proper for acquiring knowledge; and that by imitating her manner we shall have the like success. We are too apt to slight the occupations of children, whom we may observe continually busy turning every thing over and over, putting them into every situation, and at every distance. We excuse it, saying that it is an innocent amusement; but we should say with an ingenious philosopher (Dr Reid), that they are most seriously and rationally employed: they are acquiring the habits of observation; and by merely indulging an undetermined curiosity, they are making themselves acquainted with surrounding objects: they are struck by similitudes, and amused with mere classification. If some new effect occurs from any of their little plays, they are eager to repeat it. When a child has for the first time tumbled a spoon from the table, and is pleased with its jingling noise on the floor, if another lies within its reach, it is sure to share the same fate. If the child is indulged in this diversion, it will repeat it with a greediness that deserves our attention. The very first eager repetition shows a confidence in the constancy of natural operations, which we can hardly ascribe wholly to experience; and its keenness to repeat the experiment, shows the interest which it takes in the exercise of this most useful propensity. It is beginning the study of nature; and its occupation is the same with that of a Newton computing the motions of the moon by his sublime theory, and comparing his calculus with observation. The child and the philosopher are equally employed in the contemplation of a similarity of event, and are anxious that this similarity shall return. The child, it is true, thinks not of this abstract object of contemplation, but throws down the spoon again to have the pleasure of hearing it jingle. The philosopher suspects that the conjunction of events is the consequence of a general law of nature, and tries an experiment where this conjunction recurs. The child is happy, and eager to enjoy a pleasure which to us appears highly frivolous; but it has the same foundation with the pleasure of the philosopher, who rejoices in the success of his experiment: and the fact, formerly a trifle to both, now acquires importance. Both go on repeating the experiment, till the fact ceases to be a novelty to either: the child is satisfied,

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Philosophy.

and the philosopher has now established a new law of nature.

Such (says this amiable philosopher) is the education of kind nature, who from the beginning to the end of our lives makes the play of her scholars their most instructive lessons, and has implanted in our mind the curiosity and the inductive propensity by which we are enabled and disposed to learn them. The exercise of this inductive principle, by which nature prompts us to infer general laws from the observation of particular facts, gives us a species of logic new in the schools, but old as human nature. It is certainly a method of discovery; for by these means general principles, formerly unknown, have come into view.

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Is a just
logic.

It is a just and rational logic; for it is founded on, and indeed is only the habitual application of, this maxim, "That whatever is true with respect to every individual of a class of events, is true of the whole class." This is just the inverse of the maxim on which the Aristotelian logic wholly proceeds, and is of equal authority in the court of reason. Indeed the expression of the general law is only the abbreviated expression of every particular instance.

This new logic, therefore, or the logic of induction, must not be considered as subordinate to the old, or founded on it. See *Logic*, Part III. chap. 5. In fact, the use and legitimacy of the Aristotelian logic is founded on the inductive,

All animals are mortal;

All men are animals: therefore

All men are mortal.

This is no argument to any person who chooses to deny the mortality of man: even although he acknowledges his animal nature, he will deny the major proposition.

It is beside our purpose to show, how a point so general, so congenial to man, and so familiar, remained so long unnoticed, although the disquisition is curious and satisfactory. It was not till within these two centuries that the increasing demand for practical knowledge, particularly in the arts, made inquisitive men see how useless and insufficient was the learning of the schools in any road of investigation which was connected with life and business; and observe, that society had received useful information chiefly from persons actually engaged in the arts which the speculatists were endeavouring to illustrate; and that this knowledge consisted chiefly of experiments and observations, the only contributions which their authors could make to science.

The *Novum Organum* of Bacon, which points out the true method of forming a body of real and useful knowledge, namely, the study of nature in the way of description, observation, and experiment, is undoubtedly the noblest present that science ever received. It may be considered as the grammar of nature's language, and is a counter-part to the logic of Aristotle; not exploding it, but making it effectual.

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Its chief
rule

As the logic of Aristotle had its rules, so has the Baconian or inductive; and this work, the *Novum Organum Scientiarum*, contains them all. The chief rule, and indeed the rule from which all the rest are but derivations, is, that "the induction of particulars must be carried as far as the general affirmation which

is deduced from them." If this be not attended to, the mind of man, which from his earliest years shows great eagerness in searching for first principles, will frequently ascribe to the operation of a general principle events which are merely accidental. Hence the popular belief in omens, palmistry, and all kinds of fortune-telling.

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Philosophy.
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For disco-
vering ge-
neral prin-
ciples.

This rule must evidently give a new turn to the whole track of philosophical investigation. In order to discover first principles, we must make extensive and accurate observations, so as to have copious inductions of facts, that we may not be deceived as to the extent of the principle inferred from them. We must extend our acquaintance with the phenomena, paying a minute attention to what is going on all around us; and we must study nature, not shut up in our closet drawing the picture from our own fancy, but in the world, copying our lines from her own features.

To delineate human nature, we must see how men act. To give the philosophy of the material world, we must notice its phenomena.

This method of studying nature has been prosecuted during these two last centuries with great eagerness and success. Philosophers have been busy in making accurate observations of facts, and copious collections of them. Men of genius have discovered points of resemblance, from which they have been able to infer many general powers both of mind and body; and resemblances among these have suggested powers still more general.

By these efforts investigation became familiar; philosophers studied the rules of the art, and became more expert; hypotheses were banished, and nothing was admitted as a principle which was not inferred from the most copious induction. Conclusions from such principles became every day more conformable to experience. Mistakes sometimes happened; but recourse being had to more accurate observation or more copious induction, the mistakes were corrected. In the present study of nature, our steps are more slow, and hesitating and painful; our conclusions are more limited and modest, but our discoveries are more certain and progressive, and the results are more applicable to the purposes of life. This pre-eminence of modern philosophy over the ancient is seen in every path of inquiry. It was first remarkable in the study of the material world; and there it still continues to be most conspicuous. But it is no less to be seen in the later performances of philosophers in metaphysics, pneumatology, and ethics, where the mode of investigation by analysis and experiment has been greatly adopted; and we may add, that it is this juster view of the employment which has restored philosophers to the world, to society. They are no longer to be found only in the academies of the sophists and the cloisters of a convent, but in the discharge of public and private duty. A philosophic genius is a genius for observation as well as reflection, and he says, *Homo sum, bumani a me nihil alienum puto*.

77
And recti-
fying mis-
takes.

After saying so much on the nature of the employment, and the mode of procedure, it requires no deep penetration to perceive the value of the philosophical character. If there is a propensity in the human mind which

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Estimate of
the philoso-
phic cha-
racter.

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Philosophy.

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Our dispo-
sition to
refinement.

which distinguishes us from the inferior orders of sentient beings, without the least circumstance of interference, a propensity which alone may be taken for the characteristic of the species, and of which no trace is to be found in any other, it is disinterested intellectual curiosity, a love of discovery for its own sake, independent of all its advantages.

distinction of our nature is a continual disposition to refinement, of which few traces are to be found in the actions of other animals. There is hardly a gift of nature so grateful in itself as to please the freakish mind of man till he has moulded it to his fancy. Not contented with food, with raiment, and with shelter, he must have nice cookery, ornamental dress, and elegant houses. He hunts when he is not hungry, and he refines sexual appetite into a most elegant passion. In like manner he has improved this anxious desire of the knowledge of the objects around him, so as to derive from them the means of subsistence and comfort, into the most elegant and pleasing of all gratifications, the accumulation of intellectual knowledge, independent of all consideration of its advantages. And as every man has a title to the enjoyment of such pleasures as he can attain without injuring his neighbour; so it is allowable to such as have got the means of intellectual improvement, without relinquishing the indispensable social duties, to push this advantage as far as it will go: and, in all ages and countries, it has been considered as forming the greatest distinction between men of easy fortune and the poor, who must earn their subsistence by the sweat of their brow. The plebeian must learn to work, the gentleman must learn to think; and nothing can be a surer mark of a groveling soul than for a man of fortune to have an uncultivated mind.

We think highly (and with great justice do we think so) of our rational powers; but we may carry this too far, as we do every ground of self-estimation. To every man who enjoys the cheering thought of living under the care of a wise Creator, this boasted prerogative will be viewed with more modesty and diffidence; and He has given us evident marks of the rank in which He esteems the rational powers of man. In no case that is of essential importance, of indispensable necessity, not only to our well-being but to our very existence, has He left man to the care of his reason alone; for in the first instance, He has given us reason

79
We should
think modestly of
our rational
powers.

To guide the helm, while passion blows the gale.

God has not trusted either the preservation of the individual or the continuance of the race to man's notions of the importance of the task, but has committed them to the surer guards of hunger and of sexual desire. In like manner, He has not left the improvement of his noblest work, the intellectual powers of the soul of man, to his own notions how important it is to his comfort that he be thoroughly acquainted with the objects around him. No: He has committed this also to the sure hand of curiosity: and He has made this so strong in a few superior souls, whom He has appointed to give light and knowledge to the whole species, as to abstract them from all other pursuits, and to engage them in intellectual research with an ardour which no attainment can ever quench, but, on the contrary, inflames it the more by every draught of knowledge.

80
Importance
of our in-
stinctive
principles.

Let us then cherish to the utmost this distinguishing propensity of the human soul: but let us do even this like philosophers. Let us cultivate it as it is; as the handmaid to the arts and duties of life; as the guide to something yet more excellent. A character is not to be estimated from what the person knows, but from what he can perform. The accumulation of intellectual knowledge is too apt to create an inordinate appetite for it; and the man habituated to speculation is, like the miser, too apt to place that pleasure in the mere possession, which he ought to look for only or chiefly in the judicious use of his favourite object. Like the miser, too, his habits of hoarding up generally unfit him for the very enjoyment which at setting out he proposed to himself. Seldom do we find the man, who has devoted his life to scientific pursuits for their own sake, possessed of that superiority of mind which the active employ to good purpose in times of perplexity; and much seldomer do we find him possessed of that promptitude of apprehension, and that decision of purpose, which are necessary for passing through the difficult scenes of human life.

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Ought to
be cherish-
ed as far as
it is subser-
vient to the
duties of
life.

But what need words
To paint its power? For this the daring youth
Breaks from his weeping mother's fondling arms
In foreign climes to rove. The pensive sage,
Heedless of sleep, or midnight's hurtful vapour,
Hangs o'er the sickly taper.—Hence the scorn
Of all familiar prospects, though beheld
With transport once. Hence th' attentive gaze
Of young astonishment.
Such is the bounteous providence of Heaven,
In every breast implanting the desire
Of objects new and strange, to urge us on
With unremitting labour to attain
The sacred stores that wait the rip'ning soul
In Truth's exhaustless bosom. *Aiken'side.*

But human life is not a situation of continual necessity; this would ill suit the plans of its Beneficent Author: and it is from induction of phenomena totally opposite to this, and from such induction alone, that we have ever thought of a wise Creator. His wisdom appears only in His beneficence. Human life is a scene filled with enjoyment; and the soul of man is stored with propensities and powers which have pleasure, in direct terms, for their object. Another striking

But we may use the good things of this life without abusing them; and by moderation here, as in all other pursuits, derive those solid advantages which philosophy is able to bestow. And these advantages are great. To enumerate and describe them would be to write a great volume. We may just take notice of one, which is an obvious consequence of that strict and simple view which we have given of the subject; and this is, a modest opinion of our attainments. Appearances are all that we know; causes are for ever hid from our view; the powers of our nature do not lead us so far. Let us therefore, without hesitation, relinquish all pursuits which have such things as ultimate principles for objects of examination. Let us attend to the subordinations of things which it is our great business to explore.

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Limits of
our know-
ledge.

View of
Bacon's
Philosophy

explore. Among these there is such a subordination as that of means to ends, and of instruments to an operation. All will acknowledge the absurdity of the project of viewing light with a microscope. It is equally absurd for us to examine the nature of knowledge, of truth, of infinite wisdom, by our intellectual powers. We have a wide field of accessible knowledge in the works of God; and one of the greatest advantages, and of the most sublime pleasures, which we can derive from the contemplation, is the view which a judicious philosophical research will most infallibly give us of a world, not consisting of a number of detached objects, connected only by the fleeting tie of coexistence, but an *universe*, a *system* of beings, all connected together by causation, with innumerable degrees of subordination and subserviency, and all co-operating in the production of one great and glorious purpose. The heart which has but a spark of sensibility must be warmed by such a prospect, must be pleased to find itself an important part of this stupendous machine; and cannot but adore the incomprehensible Artist who contrived, created, and directs the whole. Let us not listen, then, to the timid admonitions of theological ignorance, which shrinks with superstitious horror from the thoughts of accounting for every thing by the powers of nature, and considers these attempts as an approach to atheism. Philosophical disquisition will, on the contrary, exhibit these general laws of the universe, that wonderful concatenation and adjustment of every thing both material and intellectual, as the most striking instance of incomprehensible wisdom; which, by means so few and so simple, can produce effects which by their grandeur dazzle our imagination, and by their multiplicity elude

84
Philosophical disquisition gives just notions of God and of our own souls.

all possibility of enumeration. Of all the obstacles which the weakness, the folly, or the sinful vanity of men, have thrown in the way of the theologian, there is none so fatal, so hostile to all his endeavours, as a cold and comfortless system of materialism, which the reasoning pride of man first engendered, which made a figure among a few speculatists in the last century, but was soon forgotten by the philosophers really busy with the observation of nature and of nature's God. It has of late reared up its head, being now cherished by all who wish to get rid of the stings of remorse, as the only opinion compatible with the peace of the licentious and the sensual; for we may say to them as Henry IV. said to the Prince of Wales, "Thy wish was, father Harry, to that thought." In vain will the divine attempt to lay this devil with the metaphysical exorcisms of the schools; it is philosophy alone that can detect the cheat. Philosophy singles out the characteristic phenomena which distinguish every substance; and philosophy never will hesitate in saying that there is a set of phenomena which characterise mind and another which characterise body, and that these are *toto cælo* different. Continually appealing to fact, to the phenomena, for our knowledge of every cause, we shall have no difficulty in deciding that thought, memory, volition, joy, hope, are not compatible attributes with bulk, weight, elasticity, fluidity. *Tuta sub ægide Pallas*; philosophy will maintain the dignity of human nature, will detect the sophisms of the materialists, confute their arguments; and she alone will restore to the countenance of nature that ineffable beauty of which those would deprive her, who would take away the supreme Mind which shines from within, and gives life and expression to every feature.

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Philosophy
||
Philostatus.

Natural PHILOSOPHY. See *NATURAL Philosophy*, *PHILOSOPHY*, and *PHYSICS*.

Experimental PHILOSOPHY. See *EXPERIMENTAL Philosophy*.

Moral PHILOSOPHY. See *MORAL Philosophy*.

PHILOSTORGIUS, an ecclesiastical historian of the 4th century, was born in Cappadocia, and wrote an abridgment of ecclesiastical history, in which he treats Athanasius with some severity. This work contains many curious and interesting particulars. The best edition is that of Henry de Valois in Greek and Latin. There is also attributed to him a book against Porphyry.

PHILOSTRATUS (Flavius), was an ancient Greek author. He wrote the *Life of Apollonius Tyanensis*, and some other things which have come down to our time. Eusebius against Hierocles calls him an Athenian, because he taught at Athens; but Eunapius and Suidas always speak of him as a Lemnian: and he hints, in his *Life of Apollonius*, that he used to be at Lemnos when he was young. He frequented the schools of the sophists; and he mentions his having heard Damianus of Ephesus, Proclus Naucratis, and Hippodromus of Larissa. This seems to prove that he lived in the reign of the emperor Severus, from 193 to 212, when those sophists flourished. He

P H I

became known afterwards to Severus's wife Julia Augusta, and was one of those learned men whom this philosophic empress had continually about her. It was by her command that he wrote the *Life of Apollonius Tyanensis*, as he relates himself in the same place where he informs us of his connections with that learned lady. Suidas and Hesychius say that he was a teacher of rhetoric, first at Athens and then at Rome, from the reign of Severus to that of Philippus, who obtained the empire in 244.

Philostatus's celebrated work is his *Life of Apollonius*; which has erroneously been attributed to Lucian, because it has been printed with some of that author's pieces. Philostatus endeavours, as Cyril observes, to represent Apollonius as a wonderful and extraordinary person; rather to be admired and adored as a god than to be considered as a mere man. Hence Eunapius, in the preface to his *Lives of the Sophists*, says that the proper title of that work would have been, *The Coming of a God to Men*; and Hierocles, in his book against the Christians which was called *Philalethes*, and which was refuted by Eusebius in a work still extant, among other things drew a comparison between Apollonius and Jesus Christ. It has always been supposed that Philostatus composed his work with a view to discredit the miracles and doctrines of our Lord,

Philostatus.

by

Philostatus. by setting up other miracles and other doctrines against them, and this supposition may be true; but that Apollonius was really an impostor and magician may not be so certain. He may, for what we know, have been a wise and excellent person; and it is remarkable, that Eusebius, though he had the worst opinion of Philostratus's history, says nothing ill of Apollonius. He concluded that that history was written to oppose the history of Jesus; and the use which the ancient infidels made of it justifies his opinion; but he draws no information from it with regard to Apollonius: It would have been improper to have done so; since the sophistical and affected style of Philostratus, the sources from whence he owns his materials to have been drawn, and, above all, the absurdities and contradictions with which he abounds, plainly show his history to be nothing but a collection of fables, either invented or at least embellished by himself.

The works of Philostratus, however, have engaged the attention of critics of the first class. Grævius had intended to have given a correct edition of them, as appears from the preface of Meric Casaubon to a dissertation upon an intended edition of Homer, printed at London in 1658, 8vo. So had Bentley, who designed to add a new Latin version of his notes; and Fabricius says that he saw the first sheet of Bentley's edition printed at Leipzig in 1691. Both these designs were dropped. A very exact and beautiful edition was published at length at Leipzig, 1709, in folio, by Olearius, professor of the Greek and Latin tongues in that university; who has proved himself perfectly qualified for the work he undertook, and shown all the judgment, learning, and industry, that are required in an excellent editor.

See Apollonius, p. 127. col. 1. and BLOUNT (Charles). At the end of Apollonius's Life there are 95 Letters which go under his name. They are not, however, believed to be his; the style of them being very affected, and like that of a sophist, while they bear in other respects all the marks of a forgery. Philostratus says that he saw a collection of Apollonius's Letters in Hadrian's library at Antium, but had not inserted them all among these. They are short, and have in them little else than moral sentences. The Lives of the Sophists contain many things which are to be met with nowhere else. The Heroics of Philostratus are only a dialogue between a vintner of Thracian Chersonesus and a Phœnician, in which the former draws characters of Homer's heroes, and represents several things differently from that poet; and this upon the faith of Protefilaus's ghost, who had lately visited his farm, which was not far from the tomb of this hero. Olearius conjectures, with much probability, that Philostratus's design in this dialogue was secretly to criticise some things in Homer, which he durst not do openly on account of the great veneration then paid to him, and for fear of the odium which Zoilus and others had incurred by censuring him too freely. The images are elegant descriptions and illustrations of some ancient paintings and other particulars relating to the fine arts: to which Olearius has subjoined the description of some statues by Callistratus; for the same reason that he subjoined Eusebius's book against Hierocles to the Life and Letters of Apollonius, namely, because the subjects of these respective works are related to each other. The last piece is a collection of

Philostatus's Letters; but some of these, though it is not easy to determine which, were written by a nephew to our Philostratus, of the same name, as were also the last eighteen in the book of images. This is the reason why the title runs not *Philostrati*, but *Philostatorum quæ supersunt omnia*.

There were many persons of the name of Philostratus among the ancients; and there were many other works of the Philostratus here recorded, but no others are extant besides those we have mentioned.

PHILOTIS, a servant maid at Rome, saved her countrymen from destruction. After the siege of Rome by the Gauls, the Fidenates assembled an army, and marched against the capital, demanding all the wives and daughters in the city as the only conditions of peace. This demand astonished the senators; and when they refused to comply, Philotis advised them to send all their female slaves disguised in matron's clothes, and she offered to march herself at the head. Her advice was followed; and when the Fidenates had feasted late in the evening, and were quite intoxicated and fallen asleep, Philotis lighted a torch as a signal for her countrymen to attack the enemy. The whole was successful; the Fidenates were conquered; and the senate, to reward the fidelity of the female slaves, permitted them to appear in the dress of the Roman matrons.

PHILOXENUS, an officer of Alexander, who received Cilicia at the general division of the provinces. — A son of Ptolemy, who was given to Pelopidas as an hostage. — A dithyrambic poet of Cythera. He enjoyed the favour of Dionysius tyrant of Sicily for some time, till he offended him by seducing one of his female singers. During his confinement Philoxenus composed an allegorical poem called *Cyclops*; in which he had delineated the character of the tyrant under the name of Polyphemus, and represented his mistress under the name of Galatæa, and himself under that of Ulysses. The tyrant, who was fond of writing poetry, and of being applauded, removed Philoxenus from his dungeon; but the poet refused to purchase his liberty by saying things unworthy of himself, and applauding the wretched verses of Dionysius, and therefore he was sent to the quarries. Being set at liberty, he some time after was asked his opinion at a feast about some verses which Dionysius had just repeated, and which the courtiers had received with the greatest applause. Philoxenus gave no answer, but he ordered the guards that surrounded the tyrant's table to take him back to the quarries. Dionysius was pleased with his pleasantry and with his firmness, and immediately forgave him. Philoxenus died at Ephesus about 380 years before Christ.

PHILTER, or **PHILTRE**, (*Philtrum*), in pharmacy, &c. a strainer.

PHILTER, is also used for a drug or preparation, which it is pretended will excite love. — The word is formed from the Greek φιλεω, "I love," or φιλος, "lover."

Philthers are distinguished into *true* and *spurious*, and were given by the Greeks and Romans to excite love. (See LOVE in medicine.) The spurious are spells or charms, supposed to have an effect beyond the ordinary laws of nature by some magic virtue; such are those said to be given by old women, witches, &c. — The true

Philotis
||
Philter.

Philyca
||
Phinehas.

philters are those supposed to work their effect by some natural and magnetical power. There are many grave authors who believe the reality of these philters, and allege matter of fact in confirmation of their sentiments: among the rest, Van Helmont, who says, that upon holding a certain herb in his hand for some time, and taking afterwards a little dog by the foot with the same hand, the dog followed him wherever he went, and quite deserted his former master; which he pretends to account for thus: The heat communicated to the herb, not coming alone, but animated by the emanations of the natural spirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the spirit of the other object magnetically, and gives it an amorous motion.—But this is mere cant; and all philters, whatever facts may be alleged, are mere chimeras.

PHILYCA, in botany. See PHYLICA.

PHILYRA (fab. hist.), was one of the Oceanides, whom Saturn met in Thrace. The god, to escape from the vigilance of Rhea, changed himself into a horse, to enjoy the company of Philyra, by whom he had a son half a man and half a horse, called *Chiron*. Philyra was so ashamed of giving birth to such a monster, that she entreated the gods to change her nature. She was accordingly metamorphosed into a tree, called by her name among the Greeks.

PHIMOSIS, in medicine, a disorder of the penis, in which the prepuce is so strict or tense, that it cannot be drawn back over the glans. See SURGERY.

PHINEHAS, or, as the Jews pronounce it, PINCHAS, was the son of Eleazar, and grandson of Aaron. He was the third high priest of the Jews, and discharged this office from the year of the world 2571, till towards the year 2590. He is particularly commended in Scripture for the zeal he showed in vindicating the glory of God, when the Midianites had sent their daughters into the camp of Israel, to tempt the Hebrews to fornication and idolatry. For Zimri having publicly entered into the tent of a Midianitish woman named *Cozbi*, Phinehas arose up from among the people (Numb. xxv. 7, &c.), took a javelin in his hand, entered after Zimri into that infamous place, and stabbed both man and woman at one blow, in those parts that were chiefly concerned in this criminal commerce. Upon which the plague or distemper ceased with which the Lord had already begun to punish the Israelites. This happened in the year of the world 2553.

Then the Lord said to Moses, Phinehas the son of Eleazar the high-priest has turned away my wrath from the children of Israel, because he has been zealous in my cause, and has hindered me from destroying them: wherefore acquaint him, that I give him my covenant of peace, and the priesthood shall be given to his posterity by a perpetual covenant, because he has been zealous for his God, and has made atonement for the crime of the children of Israel. This promise that the Lord made to Phinehas, to give him the priesthood by a perpetual covenant, interpreters observe, evidently included this tacit condition, that his children should continue faithful and obedient; since we know that the priesthood passed out of the family of Eleazar and Phinehas to that of Ithamar, and that it returned not to the posterity of Eleazar till after about 150 years.

This is what we find concerning the translation of

the high-priesthood from one family to the other. Phinehas, This dignity continued in the race of Phinehas, from Aaron down to the high-priest Eli, for about 335 years. See AARON.

The manner and causes of this change are unknown. It re-entered again into the family of Eleazar under the reign of Saul, when this prince having put to death Abimelech, and the other priests of Nob, he gave the high-priesthood to Zadok, who was of the race of Phinehas. At the same time, David had Abiathar with him, of the race of Eli, who performed the functions of high-priest. So that after the death of Saul, David continued the priesthood to Zadok and Abiathar conjointly. But towards the end of David's reign, Abiathar having espoused the interest of Adonijah, to the prejudice of Solomon, he was in disgrace, and Zadok only was acknowledged as high-priest. The priesthood continued in his family till after the captivity of Babylon, and even to the destruction of the temple. But from the beginning of Zadok's priesthood alone, and the exclusion of Abiathar, to the ruin of the temple, is 1084 years.

We read of another memorable action of Phinehas, in which he still showed his zeal for the Lord. This was when the Israelites that were beyond Jordan had raised upon the banks of this river a vast heap of earth (Josh. xxii. 30, 31.). Those on the other side fearing they were going to forsake the Lord, and set up another religion, deputed Phinehas and other chief men among them, to go and inform themselves of the reason of erecting this monument. But when they had found that it was in commemoration of their union and common original, Phinehas took occasion from thence to praise the Lord, saying, "We know that the Lord is with us, since you are not guilty of that prevarication we suspected you were."

We do not exactly know the time of the death of Phinehas. But as he lived after the death of Joshua, and before the first servitude under Chushtan-rishathaim, during the time that there were neither kings nor judges in the land, and every one did what was right in his own eyes (Judges xvii. 6. xviii. 1. xxi. 24.); his death is put about the year of the world 2590. It was under his pontificate that the story of Micah happened, as also that of the tribe of Dan, when they made a conquest of Laish; and the enormity that was committed upon the wife of the Levite of the mountain of Ephraim (Judges xx. 28.). Phinehas's successor in the high-priesthood was Abiezzer, or Abishuah.

The Rabbins allow a very long life to Phinehas. There are some who believe he lived to the time of the high-priest Eli, or even to the time of Samson. Others will have it, that he was the same as Eli, or rather as the prophet Elias, which would still prolong his life for several ages.

PHINEUS (fab. hist.), was a son of Agenor, king of Phœnicia, or according to some of Neptune. He became king of Thrace, or, according to the greater part of mythologists, of Bithynia. He married Cleopatra the daughter of Boreas, called by some *Cleobula*, by whom he had Plexippus and Pandion. After her death, he married Idæa the daughter of Dardanus. Idæa, jealous of his former wife's children, accused them of attempts upon their father's life and crown, or, as others assert, of attempts upon her virtue; on which they were condemned by Phineus.

Phlebotomy ^{my} **Phlegon.** Phineus to be deprived of their eyes. This cruelty was soon after punished by the gods; for Phineus suddenly became blind, and the Harpies were sent by Jupiter to keep him in continual alarm, and to spoil the meats which were placed on his table. He was afterwards delivered from these dangerous monsters by his brothers-in-law Zetes and Calais, who pursued them as far as the Strophades. He likewise recovered his sight by means of the Argonauts, whom he had received with great hospitality, and whom he instructed in the easiest and speediest way of arriving in Colchis. The causes of the blindness of Phineus are a matter of dispute among the ancients; some supposing that this was inflicted by Boreas for his cruelty to his grandson; while others attribute it to the anger of Neptune, because he had directed the sons of Phryxus how to escape from Colchis to Greece. Many, however, imagine that it proceeded from his having rashly attempted to develop future; while others assert that Zetes and Calais put out his eyes on account of his cruelty to their nephews. The second wife of Phineus is called by some *Dia*, *Eurytia*, *Danae*, and *Idothea*.—He was killed by Hercules.

PHLEBOTOMY, the opening of a vein with a proper sharp-edged and pointed instrument, in order to let out a certain quantity of blood either for the preservation or recovery of a person's health. See **SURGERY**.

PHLEGM, in the animal economy, one of the four humours whereof the ancients supposed the blood to be composed. The chemists make phlegm or water an elementary body; the characters of which are fluidity, insipidity, and volatility.

PHLEGMAGOGUES, in medicine, a term anciently made use of for such medicines as were supposed to be endowed with the property of purging off phlegm; such as hermodactyls, agaric, turbith, jalap, &c.

PHLEGOMATIC, among physicians, an appellation given to that habit or temperament of body wherein phlegm is predominant; which gives rise to catarrhs, coughs, &c.

PHLEGMON, denotes an external inflammation and tumor, attended with a burning heat.

PHLEGON, who was surnamed *Trallianus*, was born in Trallis a city of Lydia. He was the emperor Hadrian's freed man, and lived to the 18th year of Antoninus Pius; as is evident from his mentioning the consuls of that year. He wrote several works of great erudition, of which we have nothing left but fragments. Among these was a History of the Olympiads, A Treatise of Long-lived Persons, and another of Wonderful Things; the short and broken remains of which Xylander translated into Latin, and published at Basil in 1568, with the Greek and with notes. Meursius published a new edition of them with his notes at Leyden, in 1622. The titles of part of the rest of Phlegon's writings are preserved by Suidas. It is supposed that the History of Hadrian, published under Phlegon's name, was written by Hadrian himself, from this passage of Spartianus: "Hadrian thirsted so much after fame (says he), that he gave the books of his own life, drawn up by himself, to his freedmen, commanding them to publish those books under their own names; for we are told that Hadrian wrote Phlegon's books."

Phlegon's name has been more familiar among the

moderns, and his fragments have had a greater degree of regard paid to them than perhaps they deserve, merely because he has been supposed to speak of the darkness which prevailed during our Lord's passion. The book in which the words are contained is lost; but Eusebius has preserved them in his *Chronicon*. They are these: "In the 4th year of the 202d Olympiad, there was a greater and more remarkable eclipse of the sun than any that had ever happened before: for at the sixth hour the day was so turned into the darkness of night, that the very stars in the firmament were visible; and there was an earthquake in Bithynia which threw down many houses in the city of Nicæa." Eusebius thinks that these words of Phlegon related to the prodigies which accompanied Christ's crucifixion; and many other fathers of the church have thought the same: but this opinion is liable to many difficulties; for no man had ever a stronger desire than Phlegon to compile marvellous events, and to observe the supernatural circumstances in them. How was it then possible that a man of this turn of mind should not have taken notice of the most surprising circumstance in the eclipse which it is imagined he hints at, viz. its happening on the day when the moon was at the full? But had Phlegon done this, Eusebius would not have omitted it; and Origen would not have said that Phlegon had omitted this particular.

It was a matter of controversy some time ago, whether Phlegon really spoke of the darkness at the time of our Lord's passion; and many dissertations were written on both sides of the question. This dispute was occasioned by the above passage from Phlegon being left out in an edition of Clarke's Boyle's Lectures, published after his death, at the instance of Sykes, who had suggested to Clarke, that an undue stress had been laid upon it. Whiston, who informs us of this affair, expresses great displeasure against Sykes, and calls "the suggestion groundless." Upon this, Sykes published "A Dissertation on the Eclipse mentioned by Phlegon: or, An Inquiry whether that Eclipse had any relation to the darkness which happened at our Saviour's Passion, 1732," 8vo. Sykes concludes it to be most probable that Phlegon had in view a natural eclipse which happened November 24. in the 1st year of the 202d Olympiad, and not in the 4th year of the Olympiad in which Christ was crucified. Many pieces were written against him, and to some of them he replied; but perhaps it is a controversy which concerns the learned world merely, since the cause of religion is but little affected by it.

Photius blames Phlegon for expatiating too much on trifles, and for collecting too great a number of answers pronounced by the oracles. "His style (he tells us) is not altogether flat and mean, nor does it everywhere imitate the Attic manner of writing. But otherwise, the over nice accuracy and care with which he computes the Olympiads, and relates the names of the contests, the transactions, and even oracles, is not only very tiresome to the reader, whereby a cloud is thrown over all other particulars in that book, but the diction is thereby rendered unpleasant and ungrateful; and indeed he is every moment bringing in the answers pronounced by all kinds of deities."

PHLOGISTON, a term used by chemists to express a principle which was supposed to enter the composition of various bodies.

Phlegon,
Phlogiston.

Phlogiston.

The bodies which were thought to contain it in the largest quantity are the inflammable substances; and the property which these substances possess of being susceptible of inflammation was thought to depend on this principle; and hence it was sometimes called the *Principle of Inflammability*. Inflammation, according to this doctrine, was the separation of this principle or *phlogiston* from the other matter which composed the combustible body. As its separation was always attended with the emission of light and heat, some of the chemists concluded that it was light and heat combined with other matter in a peculiar manner, or that it was some highly elastic and very subtle matter, on certain modifications of which heat and light depended.

Another class of bodies which were supposed to contain phlogiston are the metals; and the chemists supposed that the peculiar lustre of the metals depended on this principle. Of this they thought themselves convinced by the evidence of their senses in two ways; viz. first, because by exposing a metal to the action of a long continued heat, it lost its metallic lustre, and was converted into an earthy-like substance called *calx metallicus*; and secondly, because by mixing this calx with any inflammable substance whatever, and subjecting the mixture to certain operations, the inflammable matter disappeared, and the metal was restored to its former state and lustre, without suffering much diminution in quantity, especially if the processes had been conducted with care and attention.

This fact relative to the metals was thought to be a full demonstration of itself, independent of other proofs which were brought to support the doctrine. These were, that a combustible body, by the act of inflammation (*i.e.* by the dissipation of its phlogiston in the form of heat and light), was converted into a body that was no longer combustible, but which might have its property of combustibility restored to it again by mixing the incombustible remains with any kind of inflammable matter, and submitting the mixture to certain processes. In this way the body was restored to its former state of inflammability.

They were also at some pains to prove that the *phlogiston* or the *principle of inflammability* was the same in all inflammable bodies and in the metals. This identity of phlogiston they thought to be evident from the fact, that the calx of a metal might be restored to its metallic state, or that the remains after the combustion of a combustible body might be again restored to its original state of combustibility by the addition of any inflammable body whatever, taken either from the animal, vegetable, or mineral kingdoms.

These and several other facts were brought to prove, not only the existence of phlogiston, but its effects in mixture with other substances; and the objections which were made against the doctrine were removed with wonderful ingenuity. The chief objection against it was, that if the inflammation of a combustible body, or the conversion of a metal into calx, depends on the dissipation or extrication of phlogiston; then it must follow, that the remains of a combustible body after inflammation, and the calx of the metal, must be less than the matter from which they were produced: but this is contrary to fact; for when we collect with care all the vapour into which the purest inflammable bodies are converted by combustion, these incombustible

remains are much heavier than the inflammable body *Phlogiston* was from which they were produced, and the calx into which a metal is converted by long exposure to the action of heat is heavier than the metal from which it was produced. This consideration made several people doubt of the truth of the doctrine; but the objection was removed by saying, that phlogiston was so subtle, as not only to have no weight, but to possess an absolute levity; and that when it was taken from an absolutely heavy body, that body must, by losing so much absolute levity, become heavier, in the same manner as the algebraists say, that a positive quantity is augmented by the subtraction of a negative quantity. This sophism satisfied the minds of most of the chemists, especially those who were algebraists.

The opinion that phlogiston was heat and light somehow combined with other matter, was proved, not only by the fact, that heat and light were emitted from a combustible body during its combustion, but from the reduction of certain metallic calces to their original metallic state again, at least in some degree, by simple exposure to heat and light. The white calx of silver for instance, when exposed in close sealed glass vessels to the light and heat of the sun, resumes a black tinge, and is in part restored to its metallic lustre without any addition whatever; but then this restoration, like the others above-mentioned, is attended with a loss of weight.

Besides constituting the principal part of inflammable bodies and metals, phlogiston was thought to be the cause of colour in all vegetable and animal substances. This was concluded from the fact of plants growing white when defended from the action of the sun's rays, and in having their green colour restored by exposure to his rays again; and so far did the chemists suffer themselves to be deceived, that they actually thought the green colouring matter, which they extracted from fresh plants by certain chemical processes, to be an inflammable substance. A very material objection was made to this argument, viz. if plants owe their colour to phlogiston imparted by the sun's rays, why do the sun's rays destroy vegetable colours that are exposed to them? for we know that the sun's rays are very effectual in diminishing the lustre of cloth dyed with vegetable colours, and in bleaching or taking out various stains from linen and other substances. All this was removed by saying, that the sun's rays possessed different powers on living and on dead vegetable matter, and that the living vegetables had the power of absorbing phlogiston from the sun's rays, which dead vegetable matter had not.

Since the existence of phlogiston, as a chemical principle in the composition of certain bodies, is now fully proved to be false, we shall not trouble our readers with any farther observations on it, except adding, that although the chemists were satisfied with the proofs they gave of its reality, they were never able to exhibit it in a separate state, or show it in a pure form, unmixed with other matter.

Phlogiston seems to have been admitted as a principle in the composition of certain bodies, and to have been supposed the cause of certain modifications of matter, merely with a view to explain some of those natural phenomena which the authors of it were unable to explain on other principles. Subsequent discoveries in natural philosophy and in chemistry have repre-

Phlogiston. represented things in a very different light from that in which the old chemists viewed them. The old chemists knew nothing but chemistry; they seldom extended their views to the observation of objects beyond their laboratories, and it was not till philosophers became chemists, and chemists philosophers, that chemistry began to wear the garb of science. The epoch in which this change began was in the time of Lord Verulam, who first removed the dimness from the chemist's eyes, and to him succeeded the Honourable Mr Boyle. Sir Isaac Newton, with the little assistance which his predecessors in this branch of science afforded him, is in reality the first who established chemistry on scientific ground. It must, however, be acknowledged, that although he made a great progress, he left much undone; and subsequent chemists, who were less accurate observers of nature, admitted principles unwarrantably. From the time of Sir Isaac Newton till the middle of the 18th century, no real improvement was made in scientific chemistry; and the progress this science has made since that period is owing to the important discovery of the existence of heat in a state of composition with other matter. Heat thus combined loses its activity or becomes insensible, just in the same way as any other active substance loses its apparent qualities in composition. Acids, for example, when combined in a certain proportion with substances for which they have strong attraction, as alkalis or absorbent earths, lose all their obvious acid qualities, and the compound turns out mild, and totally conceals the acid which it contains. In a similar manner, heat, when combined in certain proportions with other matter, loses its sensible qualities, and the compound conceals the heat which it contains. Heat, in this combined state, was called by its ingenious discoverer, Dr Black, *latent heat*, and it was found to be very abundant in the atmosphere, which owes its existence as an elastic fluid to the quantity of latent heat that it contains. After this discovery was made, Dr Crawford, considering that air was absorbed by a burning body, concluded that the heat which appears in the combustion of a combustible body, is the heat that had before existed in the air which was consumed by the burning body. Mr Lavoisier and others, prosecuting this inquiry, found that the combustible body, while it is burning, unites with the basis of the air, and that the heat which the air contained, and which was the cause of the air existing in the state of air, is expelled. This absorption of the basis of the air by the burning body, and the reduction of this basis to a solid form, accounts for the increase of weight which a body acquires by burning; or, in other words, gives a reason why the matter into which a combustible body is converted by combustion, is heavier than the body from which it was produced. The same absorption of air is observable, when a metal is converted into a calx, and the additional weight of the calx is found to be precisely equal to the weight of the air absorbed during the calcination. On these principles, therefore, we now explain the phenomena in a much more satisfactory manner than by the supposition of phlogiston, or a principle of inflammability.

This theory is more fully elucidated in several articles in the former part of this work; we shall not, therefore, in this place, repeat what the reader may

find under the words **HEAT, INFLAMMATION, FLAME, CHEMISTRY, CALCINATION of Metals, OXYGEN, &c.**

PHLOGONIE, a class of compound, inflammable, and metallic fossils, found in small masses of determinately angular figures; comprehending the pyricubia, pyroctogonia, and pyripolygonia.

PHLOMIS, the *SAGE-TREE*, or *Jerusalem Sage*; a genus of the gymnospermia order, belonging to the didynamia class of plants. There are 14 species, all of which have perennial roots, and of many the stalks also are perennial. The latter rise from two to five or six feet high; and are adorned with yellow, blue, or purple flowers in whorls. They are all ornamental plants; and deserve a place in gardens, as they are sufficiently hardy to endure the ordinary winters in this climate: they require, however, a pretty warm situation.

There are two species of this plant, which are peculiarly adapted to the shrubbery, viz. the *Phlomis fruticosa*, a native of Spain and Sicily, and the *Phlomis purpurea*. Of the first species there are three varieties, 1. The *broad-leaved Jerusalem Sage-tree*, is now very common in our gardens. Its beauty is great, and its culture very easy. It grows to be about five feet high, and spreads its branches without order all around. The older branches are covered with a dirty, greenish, dead, falling, ill looking bark; and this is the worst property of this shrub: but the younger shoots are white and beautiful; they are four-cornered, woolly, and soft to the touch. The leaves are roundish and oblong, and moderately large; and these grow opposite at the joints of the shrub on long footstalks. They are hoary to a degree of whiteness, and their footstalks also are woolly, white, tough, and strong. The flowers are produced in June, July, and August, at the top joints of the young shoots, in large whorled bunches. They are of the labiated kind, each consisting of two lips, the upper end of which is forked, and bends over the other. A finer yellow can hardly be conceived than the colour of which they are possessed; and being large, they exhibit their golden flowers at a great distance, causing thereby a handsome show. 2. The *narrow-leaved Jerusalem Sage tree*, is of lower growth than the other, seldom rising higher than a yard or four feet. This shrub is in every respect like the other; only the shoots seem to have a more upright tendency of growth. The leaves also, which are narrower, are more inclined to a lanceolate form; They are numerous in both the sorts, and hide the deformity of the bark on the older stems, which renders them less exceptionable on that account. In short, these sorts are qualified for shrubberies of all kinds, or to be set in borders of flower-gardens, where they will flower, and be exceeded even in that respect by very few shrubs. 3. *Cretan Sage-tree*, is still of lower growth than either of the former, seldom arising to a yard in height. The leaves are of the same white hoary nature; they are very broad, and stand on long footstalks. The flowers are also of a delightful yellow colour, very large, and grow in large whorls, which give the plant great beauty.

The second species, which is *Purple Phlomis* or *Portugal Sage*, is four feet high; the stalks are woody, and send forth several angular branches, which are covered with a white bark. The leaves are spear-shaped,

Phlogoniae,
Phlomis.

Planting and
Ornamental
Gardening.

Phlomis
||
Phoca.

ped, oblong, woolly underneath, crenated, and grow on short footstalks. The flowers are produced in whorls from the joints of the branches. They are of a deep purple colour, and have narrow involucra. They appear in June and July, but are not succeeded by ripe seeds in England. There is a variety of this species with iron-coloured flowers, and another with flowers of a bright purple.

There are some other shrubby sorts of phlomis, of great beauty; but these not only often lose their leaves, and even branches, from the first frost, but are frequently wholly destroyed, if it happens to be severe. They are low shrubs, very beautiful, and look well among perennial flowers, where they will not only class as to size with many of that sort, but, being rather tender, may with them have such extraordinary care as the owner may think proper to allow them.

The propagation of the above sorts is, as we have already hinted, very easy, and is accomplished either by layers or cuttings. 1. If a little earth be thrown upon the branches any time in the winter, they will strike root and be good plants by the autumn following, fit for any place. Thus easy is the culture by that method. 2. The cuttings will also grow, if planted any time of the year. Those planted in winter should be the woody shoots of the former summer: These may be set close in a shady border; and being watered in dry weather, will often grow. This shrub may be propagated by young slips also, in any of the summer months. These should be planted in a shady border, like sage, and well watered. If the border is not naturally shady, the beds must be hooped, and covered with matting in hot weather. Watering must be constantly afforded them; and with this care and management many of them will grow.

PHLOX, LYCHNIDEA, or *Bastard Lychnis*; a genus of the monogynia order, belonging to the pentandria class of plants. There are seven species, all of them natives of North America. They have perennial roots, from which arise herbaceous stalks from nine inches to two feet in height, adorned with tubulated flowers of a purple colour. They are propagated by offsets, and will bear the winters in this country. They require a moist rich soil, in which they thrive better and grow taller than in any other.

PHLYCTENÆ, in medicine, small eruptions on the skin.

PHOCA, in zoology, a genus of quadrupeds of the order of feræ. There are six parallel fore-teeth in the upper jaw, the outermost being larger; and four blunt, parallel, distinct, equal fore-teeth in the under jaw. There is but one dog-tooth, and five or six three-pointed grinders; and the hind feet are united so as to resemble a sheep's tail. There are a variety of species, the principal of which are,

1. The urfina, sea-bear, or urfine seal, has external ears. The male is greatly superior in size to the female. The bodies of each are of a conic form, very thick before, and taper to the tail. The length of a large one is

eight feet; the greatest circumference, five feet; near the tail, 20 inches; and the weight is about 800 lb. The nose projects like that of a pug-dog, but the head rises suddenly; the teeth lock into one another when the mouth is shut: the tongue is large; the eyes are large and prominent, and may be covered at pleasure by a fleshy membrane. The length of the fore-legs is 24 inches; they are like those of other quadrupeds, not immersed in the body like those of seals; the feet are formed with toes like those of other animals, but are covered with a naked skin, so that externally they seem to be a shapeless mass; the hind-legs are fixed to the body quite behind, like those of common seals; but are capable of being brought forward, so that the animal makes use of them to scratch its head.

These animals are found in the northern seas. They ^{Pennant's} are found in amazing quantities between Kamtschatka ^{Arctic Zee} and America; but are scarcely known to land on the ^{logy} Asiatic shore: nor are they ever taken except in the three Kurilian islands, and from thence in the Bobrowoie More, or Beaver Sea, as far as the Kronoski headland, off the river Kamtschatka, which comprehends only from 50 to 56 north latitude. It is observable that they never double the southern cape of the peninsula, or are found on the western side in the Penschinska sea: but their great resort has been observed to be to Bering's islands. They are as regularly migratory as birds of passage. They first appear off the three Kurili islands and Kamtschatka in the earliest spring. There is not one female which does not come pregnant. Such as are then taken are opened, the young taken out and skinned. They are found in Bering's island only on the western shore, being the part opposite to Asia, where they first appear on their migration from the south.

Urfine seals are also found in the southern hemisphere, even from under the line, in the isle of Gallipagos (A), to New Georgia, in south latitude 54. 15. and west longitude 37. 15. In the intermediate parts, they are met with in New Zealand, in the isle of Juan Fernandez, and its neighbour Massia Fuera, and probably along the coasts of Chili to Terra del Fuego and Staten Land. In Juan Fernandez, Staten Land, and New Georgia, they swarm; as they do at the northern extremity of this vast ocean. Those of the southern hemisphere have also their seasons of migration.—Alexander Selkirk, who passed three lonely years on the isle of Juan Fernandez, remarks that they come ashore in June, and stay till September. Captain Cook found them again in their place of remigration in equal abundance, on Staten Land and New Georgia in the months of December and January; and Don Pernety found them on the Falkland islands in the month of February. According to the Greenlanders, this species inhabits the southern parts of their country. They call it *Auwekejak*. That it is very fierce, and tears to pieces whatsoever it meets; that it lives on land as well as in water, and is greatly dreaded by the hunters.

During the three months of summer they lead a most indolent

(A) *Woodes Roger's Voy.* 265. He says that they are neither so numerous there, nor is their fur so fine, as those on Juan Fernandez, which is said to be extremely soft and delicate.

Phoca. indolent life: they arrive at the islands vastly fat; but during that time they are scarce ever in motion, confine themselves for whole weeks to one spot, sleep a great part of the time, eat nothing, and, except the employment the females have in suckling their young, are totally inactive. They live in families: each male has from 8 to 50 females, whom he guards with the jealousy of an eastern monarch; and though they lie by thousands on the shores, each family keeps itself separate from the rest, and sometimes, with the young and unmarried ones, amount to 120. The old animals, which are destitute of females, or deserted by them, live apart, and are excessively splanetic, peevish, and quarrelsome: are exceeding fierce, and so attached to their old haunts, that they would die sooner than quit them. They are monstrously fat, and have a most hircine smell. If another approaches their station, they are roused from their indolence, and instantly snap at it, and a battle ensues; in the conflict, they perhaps intrude on the seat of another: this gives new cause of offence, so in the end the discord becomes universal, and is spread through the whole shore.

The other males are also very irascible: the causes of their disputes are generally these. The first and most terrible is, when an attempt is made by another to seduce one of their mistresses or a young female of the family. This insult produces a combat; and the conqueror is immediately followed by the whole seraglio, who are sure of deserting the unhappy vanquished. The second reason of a quarrel is, when one invades the seat of another: the third arises from their interfering in the disputes of others. These battles are very violent; the wounds they receive are very deep, and resemble the cuts of a sabre. At the end of a fight they fling themselves into the sea, to wash away the blood.

The males are very fond of their young, but very tyrannical towards the females; if any body attempts to take their cub, the male stands on the defensive, while the female makes off with the young in her mouth; should she drop it, the former instantly quits his enemy, falls on her, and beats her against the stones, till he leaves her for dead. As soon as she recovers, she comes in the most suppliant manner to the male, crawls to his feet, and washes them with her tears: he, in the mean-time, stalks about in the most insulting manner; but in case the young one is carried off, he melts into the deepest affliction, and shows all signs of extreme concern. It is probable that he feels his misfortunes the more sensibly, as the female generally brings but one at a time, never more than two.

They swim very swiftly, at the rate of seven miles an hour. If wounded, they will seize on the boat, and carry it along with vast impetuosity, and oftentimes sink it. They can continue a long time under water. When they want to climb the rocks, they fasten with the fore-paws, and so draw themselves up. They are very tenacious of life, and will live for a fortnight after receiving such wounds as would immediately destroy any other animal.

The Kamtschatkans take them by harpooning, for they never land on their shore. To the harpoon is fastened a long line, by which they draw the animal to the boat after it is spent with fatigue; but in the

chase, the hunters are very fearful of too near an approach, least the animal should fasten on, and sink their vessel.

The uses of them are not great. The flesh of the old males is rank and nauseous; that of the females is said to resemble lamb; of the young ones roasted, a sucking pig. The skins of the young, cut out of the bellies of the dams, are esteemed for clothing, and are sold for about three shillings and fourpence each; those of the old for only four shillings.

Their remigration is in the month of September, when they depart excessively lean, and take their young with them. On their return, they again pass near the same parts of Kamtschatka which they did in the spring. Their winter retreats are quite unknown; it is probable that they are the islands between Kurili and Japan, of which we have some brief accounts, under the name of *Compagnie Land*, *States Land*, and *Jeso Gasima*, which were discovered by Martin Uriel in 1642. It is certain, that by his account the natives employed themselves in the capture of seals. Sailors do not give themselves the trouble of observing the nice distinction of specific marks; we are therefore at liberty to conjecture those which he saw to be our animals, especially as we can fix on no more convenient place for their winter quarters. They arrive along the shores of the Kurili islands, and part of those of Kamtschatka, from the south. They land and inhabit only the western side of Bering's isle which faces Kamtschatka; and when they return in September, their route is due south, pointing towards the discoveries of Uriel. Had they migrated from the south-east as well as the south-west, every isle, and every side of every isle, would have been filled with them; nor should we have found (as we do) such a constant and local residence.

2. The leonina, sea-lion, or bottlenose, is found near the south pole. One variety of this species is described at some length by the publisher of Anson's voyage. However, according to others who have written on this subject, the name of *sea-lion* belongs not so properly to this as to another, which has a mane like a true lion. Of these we have the following account from Pernetty's Historical Journal. "The hair that covers the back part of the head, neck, and shoulders, is at least as long as the hair of a goat. It gives this amphibious animal an air of resemblance to the common lion of the forest, excepting the difference of size. The sea-lions of the kind I speak of are 25 feet in length, and from 19 to 20 in their greatest circumference. In other respects they resemble the common sea-lions. Those of the small kind have a head resembling a mastiff's, with close cropt ears.

"The teeth of the sea-lions which have manes, are much larger and more solid than those of the rest. In these, all the teeth which are inserted into the jaw-bone are hollow. They have only four large ones, two in the lower and two in the upper jaw. The rest are not even so large as those of a horse. I brought home one belonging to the true sea-lion, which is at least three inches in diameter, and seven in length, though not one of the largest. We counted 22 of the same sort in the jaw-bone of one of these lions, where five or six were wanting. They were entirely solid, and projected scarce more than an inch, or an inch and

Phoca.

Phoca.

a half beyond their sockets. They are nearly equal in solidity to flint, and are of a dazzling white. Several of our seamen took them for white flints when they found them upon the shore. I could not even persuade them that they were not real flints, except by rubbing them against each other, or breaking some pieces off, to make them sensible that they exhaled the same smell as bones and ivory do when they are rubbed or scraped.

"These sea-lions that have manes are not more mischievous or formidable than the others. They are equally unwieldy and heavy in their motions; and are rather disposed to avoid than to fall upon those who attack them. Both kinds live upon fish and water-fowl, which they catch by surprise. They bring forth and suckle their young ones among the corn-stacks, where they retire at night, and continue to give them suck till they are large enough to go to sea. In the evening you see them assembling in herds upon the shore, and calling their dams in cries so much like lambs, calves, and goats, that, unless apprised of it, you would easily be deceived. The tongue of these animals is very good eating: we preferred it to that of an ox or calf. For a trial we cut off the tip of the tongue hanging out of the mouth of one of these lions which was just killed. About 16 or 18 of us eat each a pretty large piece, and we all thought it so good, that we regretted we could not cut more of it.

"It is said that their flesh is not absolutely disagreeable. I have not tasted it: but the oil which is extracted from their grease is of great use. This oil is extracted two ways; either by cutting the fat in pieces, and melting it in large cauldrons upon the fire; or by cutting it in the same manner upon hurdles, or pieces of board, and exposing them to the sun, or only to the air: this grease dissolves of itself, and runs into vessels placed underneath to receive it.—Some of our seamen pretended, that this last sort of oil, when it is fresh, is very good for kitchen uses: this, as well as the other, is commonly used for dressing leather for vessels, and for lamps. It is preferred to that of the whale: it is always clear, and leaves no sediment.

"The skins of the sea-lions are used chiefly in making portmanteaus, and in covering trunks. When they are tanned, they have a grain almost like Morocco. They are not so fine, but are less liable to tear, and keep fresh a longer time. They make good shoes and boots, which, when well seasoned, are water-proof.

"One day Mr Guyot and some others brought on board five sea lionesses. They were about seven feet long, and three and a half in circumference, tho' their intestines were drawn. These gentlemen had landed on a small island, where they found a prodigious number of these animals, and killed eight or nine hundred of them with sticks. No other weapon is necessary on these occasions. A single blow with a bludgeon, three feet or three feet and a half long, almost full at the nose of these animals, knocks them down, and kills them on the spot.

"This is not altogether the case with the males: their size is prodigious. Our gentlemen encountered two of them for a long time, with the same weapons, without being able to overcome them. They lodged

three balls in the throat of one while he opened his mouth to defend himself, and three musket-shot in his body. The blood gushed from his wounds like wine from a tap. However, he crawled into the water and disappeared. A sailor attacked the other, and engaged him for a long time, striking him on the head with a bludgeon, without being able to knock him down: the sailor fell down very near his antagonist, but had the dexterity to recover himself at the instant the lion was going to gorge him. Had he once seized him, the man would infallibly have been lost: the animal would have carried him into the water as they usually do their prey, and there feasted upon him. In his retreat to the sea this animal seized a penguin, and devoured him instantaneously."

Mr Pennant describes three seals of different species, which are called *sea-lions*, viz. the *phoca leonina*, or hooded seal; the *phoca leonina*, or bottlenose; and the *bestia marina*, or leonine seal. He differs in some particulars from the author just quoted; and such of our readers as desire to know these differences, we refer to his works.

3. The vitulina, sea-calf, or common seal, inhabits the European ocean. It has a smooth head without external ears; and the common length is from five to six feet. The fore-legs are deeply immersed in the skin of the body: the hind legs are placed in such a manner as to point directly backwards: every foot is divided into five toes; and each of those connected by a strong and broad web, covered on both sides with short hair. The toes are furnished with strong claws, well adapted to assist the animal in climbing the rocks it basks on: the claws on the hind-feet are slender and straight; except at the ends, which are a little incurvated. The head and nose are broad and flat, like those of the otter; the neck short and thick; the eyes large and black: in lieu of external ears, it has two small orifices: the nostrils are oblong: on each side the nose are several long stiff hairs; and above each eye are a few of the same kind. The form of the tongue is so singular, that were other notes wanting, that alone would distinguish it from all other quadrupeds; being forked, or slit at the end. The cutting teeth are singular in respect to their number, being six in the upper jaw, and only four in the lower. It has two canine teeth above and below, and on each side of the jaw five grinders: the total 34. The whole animal is covered with short hair, very closely set together: the colour of that on the body is generally dusky, spotted irregularly with white; on the belly white: but seals vary greatly in their marks and colours, and some have been found entirely white.

The seal is common on most of the rocky shores of Great Britain and Ireland, especially on the northern coasts: in Wales, it frequents the coasts of Caernarvonshire and Anglesey. They inhabit all the European seas, even to the extreme north; are found far within the arctic circle, in the seas both of Europe and Asia, and are even continued to those of Kamtschatka*. It preys entirely on fish, and never molests the sea-fowl: for numbers of each are often seen floating on the waves, as if in company. Seals eat their prey beneath the water; and in case they are devouring any very oily fish, the place is known by a certain smoothness of the waves immediately above. The

Phoca.

* Steller.
in Nov.
Com. Patrop.
ii. 290.

Phoca. power of oil in stilling the waves excited by a storm is mentioned by Pliny: the moderns have made the experiment with success; and thereby made one advance towards eradicating the vulgar prejudices against that great and elegant writer.

Seals are excellent swimmers, and ready divers; and are very bold when in the sea, swimming carelessly enough about boats: their dens or lodgments are in hollow rocks or caverns near the sea, but out of the reach of the tide: in the summer they will come out of the water, to bask or sleep in the sun on the top of large stones or shivers of rocks; and that is the opportunity our countrymen take of shooting them: if they chance to escape, they hasten towards their proper element, flinging stones and dirt behind them as they scramble along; at the same time expressing their fears by piteous moans: but if they happen to be overtaken, they will make a vigorous defence with their feet and teeth till they are killed. They are taken for the sake of their skins, and for the oil their fat yields: the former sell for 4 s. or 4 s. 6 d. a-piece; which, when dressed, are very useful in covering trunks, making waistcoats, shot-pouches, and several other conveniences. We remember some years ago to have seen a young seal in some degree domesticated. It was taken at a little distance from the sea, and was generally kept in a vessel full of salt water; but sometimes it was allowed to crawl about the house, and even to approach the fire. Its natural food was regularly procured for it, and it was taken to the sea every day and thrown in from a boat. It used to swim after the boat, and always allowed itself to be taken back. It lived thus for several weeks; and we doubt not would have lived much longer had it not been sometimes too roughly used by the boys who took it to and from the sea.

The flesh of these animals, and even of porpoises, formerly found a place at the tables of the great; as appears from the bill of fare of that vast feast that Archbishop Nevill gave in the reign of Edward IV. in which is seen that several were provided on the occasion. They couple about April, on large rocks or small islands not remote from the shore; and bring forth in those vast caverns that are frequent on our coasts: they commonly bring two at a time, which in their infant state are covered with a whitish down or woolly substance. The seal-hunters in Caithness say, that their growth is so sudden, that in nine tides from their birth (108 hours) they will become as active as their parents. On the coast of that country are immense caverns opening into the sea, and running some hundreds of yards beneath the land. These are the resort of seals in the breeding time, where they continue till their young are old enough to go to sea, which is in about six or seven weeks. The first of these caves is near the Ord, the last near Thrumster: their entrance is so narrow as only to admit a boat; their inside very spacious and lofty. In the month of October, or the beginning of November, the seal-hunters enter the mouth of the caverns about midnight, and rowing up as far as they can, they land; each of them being provided with a bludgeon, and properly stationed, they light their torches, and make a great noise, which brings down the seals from the farther end in a confused body with fearful shrieks and cries: at first the men are obliged to give way for fear of being overborne; but when

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the first crowd is past, they kill as many as straggle behind, chiefly the young, by striking them on the nose; a very slight blow on that part dispatches them. When the work is over, they drag the seals to the boat, which two men are left to guard. This is a most hazardous employment; for should their torches go out, or the wind blow hard from sea during their continuance in the cave, their lives are lost. The young seals of six weeks age yield more oil than their emaciated dams: above eight gallons have been got from a single whelp, which sells from 6 d. to 9 d. per gallon; the skins from 6 d. to 1 s. each.

The natural history of this animal may be further elucidated by the following extracts from a letter of the reverend Dr William Borlase, dated October the 24th 1763. "The seals are seen in the greatest plenty on the shores of Cornwall in the months of May, June, and July. They are of different sizes; some as large as a cow, and from that downwards to a small calf. They feed on most sorts of fish which they can master; and are seen searching for their prey near shore, where the whistling fish, wraws, and pollocks, resort. They are very swift in their proper depth of water, dive like a shot, and in a trice rise at 50 yards distance; so that weaker fishes cannot avoid their tyranny except in shallow water. A person of the parish of Sennan saw not long since a seal in pursuit of a mullet (that strong and swift fish); the seal turned it to and fro in deep water, as a greyhound does a hare: the mullet at last found it had no way to escape, but by running into shoal water: the seal pursued; and the former, to get more surely out of danger, threw itself on its side, by which means it darted into shoaler water than it could have swam in with the depth of its paunch and fins, and so escaped. The seal brings her young about the beginning of autumn: our fishermen have seen two sucking their dam at the same time, as she stood in the sea in a perpendicular position. Their head in swimming is always above water, more so than that of a dog. They sleep on rocks surrounded by the sea, or on the less accessible parts of our cliffs left dry by the ebb of the tide; and if disturbed by any thing, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving; seldom longer than a minute; then raise their heads, and if they hear or see nothing more than ordinary, lie down again, and so on, raising their heads a little and reclining them alternately in about a minute's time. Nature seems to have given them this precaution, as being unprovided with auricles or external ears; and consequently not hearing very quick, nor from any great distance."

These animals are so very useful to the inhabitants of Greenland and other arctic people, that they may be called their flocks. We cannot give a better account of these uses than in the words of Mr Crantz, who was long resident in those northern regions.

"Seals (says he) are more needful to them than sheep are to us, though they furnish us with food and raiment; or than the cocoa-tree is to the Indians, although that presents them not only with meat to eat, and covering for their bodies, but also houses to dwell in, and boats to sail in, so that in case of necessity they could live solely from it. The seals flesh (together with the rein-deer, which is already grown pretty

4 H

scarce)

Phoca.

*Pennant's
British Zoo-
logy.*

Phoca.

scarce) supplies the natives with their most palatable and substantial food. Their fat furnishes them with oil for lamp-light, chamber and kitchen fire; and whoever sees their habitations, presently finds, that if they even had a superfluity of wood, it would not do, they can use nothing but train in them. They also mollify their dry food, mostly fish, in the train; and finally, they barter it for all kinds of necessaries with the factor. They can sew better with fibres of the seals sinews than with thread or silk. Of the skins of the entrails they make their windows, curtains for their tents, shirts, and part of the bladders they use at their harpoons; and they make train bottles of the maw. Formerly, for want of iron, they made all manner of instruments and working tools of their bones. Neither is the blood wasted, but boiled with other ingredients, and eaten as soup. Of the skin of the seal they stand in the greatest need; for, supposing the skins of rein-deer and birds would furnish them with competent clothing for their bodies, and coverings for their beds; and their flesh, together with fish, with sufficient food; and provided they could dress their meat with wood, and also new-model their house-keeping, so as to have light, and keep themselves warm with it too; yet without the seals-skins they would not be in a capacity of acquiring these same rein-deer, fowls, fishes, and wood; because they must cover over with seal-skin both their large and small boats in which they travel and seek their provision. They must also cut their thongs or straps out of them, make the bladders for their harpoons, and cover their tents with them; without which they could not subsist in summer.

"Therefore no man can pass for a right Greenlander who cannot catch seals. This is the ultimate end they aspire at, in all their device and labour from their childhood up. It is the only art (and in truth a difficult and dangerous one it is) to which they are trained from their infancy; by which they maintain themselves, make themselves agreeable to others, and become beneficial members of the community*.

"The Greenlanders have three ways of catching seals: either singly, with the bladder; or in company, by the clapper-hunt; or in the winter on the ice: whereto may be added the shooting them with a gun.

"The principal and most common way is the taking them with the bladder. When the Greenlander sets out equipped, and spies a seal, he tries to surprise it unawares, with the wind and sun in his back, that he may not be heard or seen by it. He tries to conceal himself behind a wave, and makes hastily but softly up to it, till he comes within four, five, or six fathom of it; meanwhile he takes the utmost care that the harpoon, line, and bladder, lie in proper order. Then he takes hold of the oar with his left hand, and the harpoon with his right by the hand-board, and so away he throws it at the seal, in such a manner that the whole dart flies from the hand-board and leaves that in his hand. If the harpoon hits the mark, and buries itself deeper than the barbs, it will directly disengage itself from the bone-joint, and that from the shaft; and also unwind the string from its lodge on the kajak. The moment the seal is pierced, the Greenlander must throw the bladder, tied to the end of the

string, into the water, on the same side as the seal runs and dives; for that he does instantly like a dart. Then the Greenlander goes and takes up the shaft swimming on the water, and lays it in its place. The seal often drags the bladder with it under water, tho' it is a considerable impediment, on account of its great bigness; but it so wearies itself out with it, that it must come up again in about a quarter of an hour to take breath. The Greenlander hastens to the spot where he sees the bladder rise up, and smites the seal as soon as it appears with a great lance. This lance always comes out of its body again; but he throws it at the creature afresh every time it comes up till it is quite spent. Then he runs the little lance into it, and kills it outright, but stops up the wound directly to preserve the blood; and lastly, he blows it up, like a bladder, betwixt skin and flesh, to put it into a better capacity of swimming after him; for which purpose he fastens it to the left side of his kajak or boat.

"In this exercise the Greenlander is exposed to the most and greatest danger of his life; which is probably the reason that they call this hunt or fishery *kamarvoek*, i. e. "the extinction," viz. of life. For if the line should entangle itself, as it easily may, in its sudden and violent motion; or if it should catch hold of the kajak, or should wind itself round the oar, or the hand, or even the neck, as it sometimes does in windy weather; or if the seal should turn suddenly to the other side of the boat, it cannot be otherwise than that the kajak must be overturned by the string, and drawn down under water. On such desperate occasions the poor Greenlander stands in need of every possible art to disentangle himself from the string, and to raise himself up from under the water several times successively; for he will continually be overturning till he has quite disengaged himself from the line. Nay, when he imagines himself to be out of all danger, and comes too near the dying seal, it may still bite him in the face or hand; and a female seal that has young, instead of flying the field, will sometimes fly at the Greenlander in the most vehement rage, and do him a mischief, or bite a hole in his kajak that he must sink.

"In this way, singly, they can kill none but the careless stupid seal called *attarfoak*. Several in company must pursue the cautious *kassigiak* by the clapper-hunt. In the same manner they also surround and kill the *attarfoit* in great numbers at certain seasons of the year; for in autumn they retire into the creeks or inlets in stormy weather, as in the Nepiset sound in Ball's river, between the main land and the island Kangek, which is full two leagues long, but very narrow. There the Greenlanders cut off their retreat, and frighten them under water by shouting, clapping, and throwing stones; but as they must come up again continually to draw breath, then they persecute them again till they are tired, and at last are obliged to stay so long above water that they surround them, and kill them with a kind of dart for the purpose. During this hunt we have a fine opportunity to see the agility of the Greenlanders, or, if I may call it so, their hussar-like manœuvres. When the seal rises out of the water, they all fly upon it as if they had wings, with a desperate noise; the poor creature is forced to dive again directly; and the moment he does they dis-

Phoca.

* Hist.
Greenl.
p. 130.

Phoca. perse again as fast as they came, and every one gives heed to his post to see where it will start up again; which is an uncertain thing, and is commonly three quarters of a mile from the former spot. If a seal has a good broad water, three or four leagues each way, it can keep the sportsmen in play for a couple of hours before it is so spent that they can surround and kill it. If the seal in its fright betakes itself to the land for a retreat, it is welcomed with sticks and stones by the women and children, and presently pierced by the men in the rear. This is a very lively and a very profitable diversion for the Greenlanders, for many times one man will have eight or ten seals for his share.

"The third method of killing seals upon the ice is mostly practised in Disko, where the bays are frozen over in the winter. There are several ways of proceeding. The seals themselves make sometimes holes in the ice, where they come and draw breath; near such a hole a Greenlander seats himself on a stool, putting his feet on a lower one to keep them from the cold. Now when the seal comes and puts its nose to the hole, he pierces it instantly with his harpoon; then breaks the hole larger, and draws it out and kills it quite. Or a Greenlander lays himself upon his belly on a kind of a sledge, near other holes, where the seals come out upon the ice to bask themselves in the sun. Near this great hole they make a little one, and another Greenlander puts a harpoon into it with a very long shaft or pole. He that lies upon the ice looks into the great hole, till he sees a seal coming under the harpoon; then he gives the other the signal, who runs the seal through with all his might.

"If the Greenlander sees a seal lying near its hole upon the ice, he slides along upon his belly towards it, wags his head, and grunts like a seal; and the poor seal, thinking it is one of its innocent companions, lets him come near enough to pierce it with his long dart. When the current wears a great hole in the ice in the spring, the Greenlanders plant themselves all round it, till the seals come in droves to the brim to fetch breath, and then they kill them with their harpoons. Many also are killed on the ice while they lie sleeping and snoring in the sun."

To this long quotation, which we think both curious and interesting, we shall subjoin the following observations of Mr Pennant, which are not less worthy of attention.

Arctic Zoology, v. 1.

"Nature (says this intelligent writer) has been so niggardly in providing variety of provision for the Greenlanders, that they are necessitated to have recourse to such which is offered to them with a liberal hand. The Kamtschatkan nations, which enjoy several animals, as well as a great and abundant choice of fish, are so enamoured with the taste of the fat of seals, that they can make no feast without making it one of the dishes. Of that both Russians and Kamtschatkans make their candles. The latter eat the flesh boiled, or else dried in the sun. If they have a great quantity, they preserve it in the following manner:

"They dig a pit of a requisite depth, and pave it with stones; then fill it with wood, and set it on fire so as to heat the pit to the warmth of a stove. They then collect all the cinders into a heap. They strew the bottom with the green wood of alder, on which they place separately the flesh and the fat, and put

between every layer branches of the same tree; when the pit is filled they cover it with sods, so that the vapour cannot escape. After some hours they take out both fat and flesh, and keep it for winter's provisions, and they may be preserved a whole year without spoiling.

"The Kamtschatkans have a most singular ceremony. After they take the flesh from the heads of the seals, they bring a vessel in form of a canoe, and sling into it all the skulls, crowned with certain herbs, and place them on the ground. A certain person enters the habitation with a sack filled with *tonchitche*, sweet herbs, and a little of the bark of willow. Two of the natives then roll a great stone towards the door, and cover it with pebbles; two others take the sweet herbs and dispose them, tied in little packets. The great stone is to signify the sea-shore, the pebbles the waves, and the packets seals. They then bring three dishes of a hash called *tolkoucha*: of this they make little balls, in the middle of which they stick the packets of herbs: of the willow-bark they make a little canoe, and fill it with *tolkoucha*, and cover it with the sack. After some time the two Kamtschatkans, who had put the mimic seals into the *tolkoucha*, take the balls, and a vessel resembling a canoe, and draw it along the sand as if it was on the sea, to convince the real seals how agreeable it would be to them to come among the Kamtschatkans, who have a sea in their very jurts or dwellings. And this they imagine will induce the seals to suffer themselves to be taken in great numbers. Various other ceremonies, equally ridiculous, are practised; in one of which they invoke the winds, which drive the seals on their shores, to be propitious.

"Besides the uses which are made of the flesh and fat of seals, the skins of the largest are cut into soles for shoes. The women make their summer boots of the undressed skins, and wear them with the hair outmost. In a country which abounds so greatly in furs, very little more use is made of the skins of seals in the article of dress than what has been mentioned. But the Koriaks, the Oloutores, and Tehutschi, form with the skins canoes and vessels of different sizes, some large enough to carry thirty people.

"Seals swarm on all the coasts of Kamtschatka, and will go up the rivers eighty versts in pursuit of fish. The Tungusi give the milk of these animals to their children instead of physic. The navigators observed abundance of seals about Bering's island, but that they decreased in numbers as they advanced towards the straits; for where the walruses abounded, the seals grew more and more scarce.

"I did not observe any seal-skin garments among those brought over by the navigators, such as one might have expected among the Esquimaux of the high latitudes they visited, and which are so much in use with those of Hudson's Bay and Labrador. That species of dress doubtless was worn in the earliest times. These people wanted their historians; but we are assured that the Massagetæ clothed themselves in the skins of seals. They, according to D'Anville, inhabited the country to the east of the Caspian sea, and the lake Aral, both of which waters abound with seals.

"Seals are now become a great article of commerce. The oil from the vast whales is no longer equal to the demand for supplying the magnificent profusion of

Phoca.

lamps in and round our capital. The chase of these animals is redoubled for that purpose; and the skins, properly tanned, are in considerable use in the manufactory of boots and shoes."

4. The phoca barbata, or great seal, has long white whiskers with curled points. The back is arched; hair black, very deciduous, and very thinly dispersed over a thick skin, which is almost naked in summer. The teeth of this species are like those of the common seal; the fore-feet are like the human hand, the middle toe being the longest and the thumb short. They are upwards of 12 feet long.

The inhabitants of Greenland cut out of the skin of this species thongs and lines, a finger-thick, for the seal-fishery. Its flesh is as white as veal, and is esteemed the most delicate of any. They produce plenty of lard, but very little oil. The skins of the young are sometimes used to lie on.—It inhabits the high sea about Greenland, is very timid, and commonly rests on the floating ice. It breeds about the month of March, and brings forth a single young on the ice, generally among the islands; for then it approaches a little nearer to the land. The great old ones swim very slowly.

On the northern coast of Scotland is found a seal twelve feet long. A young one, seven feet and a half long, was shown in London some years ago, which was so far from maturity as to have scarcely any teeth*: yet the common seals have them complete before they attain the size of six feet, their utmost growth.

A species larger than an ox was found in the Kamtschatkan seas from 56 to 64 north latitude, called by the natives *lachtetak*†. They weighed 800 pounds, and were eaten by Bering's crew; but their flesh was very loathsome‡. The cubs are entirely black.

Steller has given accounts of other seals found in those wild seas; but his descriptions are so very imperfect as to render it impossible to ascertain the species. He speaks in his MSS. of a middle sized kind, wholly and most elegantly spotted; of another which is black with brown spots, having the belly of a yellowish white, and as large as a yearling ox. He mentions a third species, black, and with a particular formation of the hinder legs; and a fourth of a yellowish colour, with a great circle on it of the colour of cherries||.

5. The phoca fœtida, or rough seal, is distinguished by a short nose and short round head; a body almost elliptical, covered with lard almost to the hind feet. This species seldom if ever exceeds four feet in length. Their hairs are closely set together, soft, long, and somewhat erect, intermixed with curled. They are of a dusky colour, mixed with white, which sometimes varies to white, with a dusky dorsal line.

This species never frequents the high seas, but keeps on the fixed ice in the remote bays near the frozen land; and when old never forsakes its haunts. They couple in June, and bring forth in January on the fixed ice, its proper element. In that cold situation they have a hole for the benefit of fishing; near which they generally remain solitary, being rarely found in pairs. They are very incautious, and often sleep on the surface of the water, by which means they become an easy prey to the eagle. They feed on small fish, shrimps, &c. The skin, tendons, and lard, are used in the same

way with those of other seals. The flesh is red and fœtid, especially in males, which is nauseated even by the inhabitants of Greenland.

The seal-hunters in Newfoundland have a larger kind, which they call the *square phipper*, and which weighs 500 pounds. Its coat is like that of a water-dog; so that it appears by the length of its hair to be allied to this species; but the vast difference in size admits not of certainty in this respect.

6. The phoca leporina, or leporine seal, has hair of a dirty white colour, tinged with yellow, but never spotted. The hairs are erect, interwoven, and soft like those of a hare, especially in the young. The head is long; the upper lip swelling and thick; the whiskers very strong and very thick, ranged in 15 rows, covering the whole front of the lip, so that it appears bearded; the eyes are blue, and the pupil of them black; the teeth are strong; the fore-feet are short; the membranes of the hind feet are even and not waved; the tail is short and thick, it being four inches two lines in length; the cubs are of a milk white colour. The length of the species is about six feet six inches, and the circumference where greatest five feet two.

This species inhabits the White Sea in the summer time, and ascends and descends the mouths of rivers with the tide in quest of prey. It is likewise found on the coasts of Iceland, and within the polar circle from Spitzbergen to Tchutki Nofs, and from thence southward about Kamtschatka.

There are several other species of this genus, and a variety of curious particulars respecting them, which our limits permit us not to give. Such of our readers, however, as wish for further information on this subject, will find themselves amply gratified by a careful perusal of what Mr Pennant has written on the subject, from whose labours we have extracted much of our article. See his *History of Quadrupeds*, Vol. II. p. 518—536. his *Arctic Zoology*, Vol. I. p. 151—177. and his *British Zoology*, as also the several authors whose works he quotes.

PHOCÆA, the last town of Ionia, (Mela, Pli-ny); of Æolis, (Ptolemy), because situated on the right or north side of the river Hermus, which he makes the boundary of Æolis to the south. It stood far in the land, on a bay or arm of the sea; had two very safe harbours, the one called *Lampter* the other *Naustathmos*, (Livy). It was a colony of Ionians, situated in the territory of Æolis, (Herodotus). Massilia in Gaul was again a colony from it. *Phocæenses*, the people, (Livy); *Phocæicus*, the epithet, (Lucan); applied to *Marseilles*. It was one of the 12 cities which assembled in the panionium or general council of Ionia.

Some writers tell us, that while the foundations of this city were laying, there appeared near the shore a great shoal of sea-calves; whence it was called *Phocæa*, the word *phoca* signifying in Greek a *sea-calf*. Ptolemy, who makes the river Hermus the boundary between Æolia and Ionia, places Phocæa in Æolis; but all other geographers reckon it among the cities of Ionia. It stood on the sea-coast, between Cuma to the north, and Smyrna to the south, not far from the Hermus; and was, in former times, one of the most wealthy and powerful cities of all Asia; but is now a poor

Phoca

Phocæa

* Phil.
Transf.
Abr. ix. 74.
tab. v.
xlvii. 120.

† Nov. Com.
Petrof. ii.
290.

‡ Muller's
Fay.

|| Dr Pal-
las, &
Descr.
Kamtschat-
ka, 420.

Ancient
Univ. Hist.
vol. vi.

Phocæa.

poor beggarly village, though the see of a bishop. The Phocæans were expert mariners, and the first among the Greeks that undertook long voyages; which they performed in galleys of fifty oars. As they applied themselves to trade and navigation, they became acquainted pretty early with the coasts and islands of Europe, where they are said to have founded several cities, namely, Velia in Italy; Alalia, or rather Aleria, in Corsica; and Marseilles in Gaul. Neither were they unacquainted with Spain; for Herodotus tells us, that, in the time of Cyrus the Great, the Phocæans arriving at Sartessus, a city in the Bay of Cadiz, were treated with extraordinary kindness by Arganthonius king of that country; who, hearing that they were under no small apprehension of the growing power of Cyrus, invited them to leave Ionia, and settle in what part of his kingdom they pleased. The Phocæans could not be prevailed upon to forsake their country; but accepted a large sum of money, which that prince generously presented them with, to defray the expence of building a strong wall round their city. The wall they built on their return; but it was unable to resist the mighty power of Cyrus, whose general Harpagus, investing the city with a numerous army, soon reduced it to the utmost extremities. The Phocæans, having no hopes of any succour, offered to capitulate; but the conditions offered by Harpagus seeming severe, they begged he would allow them three days to deliberate; and, in the mean time, withdraw his forces. Harpagus, though not ignorant of their design, complied with their request. The Phocæans, taking advantage of this condescension, put their wives, children, and all their most valuable effects, on board several vessels which they had ready equipped, and conveyed them safe to the island of Chios, leaving the Persians in possession of empty houses. Their design was to purchase the Cænesian islands, which belonged to the Chians, and settle there. But the Chians not caring to have them so near, lest they should engross all the trade to themselves, as they were a sea-faring people, they put to sea again; and, having taken Phocæa, their native country, by surprise, put all the Persians they found in it to the sword. They went to Corsica; great part of them however returned very soon, as did the rest also in a few years. They then lived in subjection either to the Persians, or tyrants of their own. Among the latter we find mention made of Laodamus, who attended Darius Hystaspis in his expedition against the Scythians; and of Dionysius, who, joining Aristagoras, tyrant of Miletus, and chief author of the Ionian rebellion, retired, after the defeat of his countrymen, to Phœnicia, where he made an immense booty, seizing on all the ships he met with trading to that country. From Phœnicia he sailed to Sicily, where he committed great depredations on the Carthaginians and Tuscans; but is said never to have molested the Greeks.

In the Roman times the city of Phocæa sided with Antiochus the Great; whereupon it was besieged, taken, and plundered, by the Roman general; but allowed to be governed by its own laws. In the war which Aristonicus brother to Attalus, king of Pergamus, raised against the Romans, they assisted the former to the utmost of their power; a circumstance which so displeased the senate, that they commanded the town to be demolished, and the whole race of the Phocæans

to be utterly rooted out. This severe sentence would have been put in execution, had not the Massilienses, a Phocæan colony, interposed, and, with much difficulty, assuaged the anger of the senate. Pompey declared Phocæa a free city, and restored the inhabitants to all the privileges they had ever enjoyed; whence, under the first emperors, it was reckoned one of the most flourishing cities of all Asia Minor. This is all we have been able to collect from the ancients touching the particular history of Phocæa.

PHOCAS, a Roman centurion, was raised to the dignity of emperor by the army, and was crowned at Constantinople about the year 603. The emperor Mauritius, who was thus deserted both by the army and the people, fled to Chalcedon with his five children, whom Phocas caused to be inhumanly murdered before his eyes, and then he murdered Mauritius himself, his brother, and several other persons who were attached to that family.

Phocas, thus proclaimed and acknowledged at Constantinople, sent, according to custom, his own image and that of his wife Leontia to Rome, where they were received with loud acclamations, the people there being incensed against Mauritius on account of the cruel exactions of the exarchs, and his other ministers in Italy. Gregory, surnamed the Great, then bishop of Rome, caused the images to be lodged in the oratory of the martyr Cæsarius, and wrote letters to the new emperor, congratulating him upon his advancement to the throne, which he said was effected by a particular providence, to deliver the people from the innumerable calamities and heavy oppressions under which they had long groaned. Had we no other character of Phocas and Leontia but that which has been conveyed to us in Gregory's letters, we should rank him amongst the best princes mentioned in history; but all other writers paint him in quite different colours; and his actions, transmitted to us by several historians, evidently speak him a most cruel and blood-thirsty tyrant. He was of middling stature, says Cedrenus, deformed, and of a terrible aspect: his hair was red, his eye-brows met, and one of his cheeks was marked with a scar, which, when he was in a passion, grew black and frightful: he was greatly addicted to wine and women, blood-thirsty, inexorable, bold in speech, a stranger to compassion, in his principles a heretic. He endeavoured, in the beginning of his reign, to gain the affections of the people by celebrating the Circensian games with extraordinary pomp, and distributing on that occasion large sums amongst the people; but finding that instead of applauding they reviled him as a drunkard, he ordered his guards to fall upon them. Some were killed, many wounded, and great numbers were dragged to prison: but the populace rising, set them at liberty, and thenceforth conceived an irreconcilable aversion to the tyrant.

As soon as the death of Mauritius was known, Narses, who then commanded the troops quartered on the frontiers of Persia, revolted. Phocas, however, managed matters so as to gain him over to his interest, and then treacherously and cruelly burnt him alive. He endeavoured to strengthen his cause by respectable alliances; but his cruelty was such as to render him generally hated, for he spared neither sex nor age, and amongst others he murdered Constantina the widow of Mauritius.

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Mauritius, and her daughters. These cruelties were at length the cause of his downfall. He became universally hateful; and persons in great authority near his person conspired against him. This conspiracy, however, was discovered, and the persons concerned in it were all put to death. The following year, however, 610, he was overtaken by the fate he had so long deserved.

Heraclius, the son of the governor of Africa, who bore the same name, taking upon him the title of emperor, and being acknowledged as such by the people of Africa, sailed from thence with a formidable fleet, and a powerful army on board, for Constantinople, while Nicetas marched thither by way of Alexandria and the Pentapolis. Heraclius steered his course to Abydus, where he was received with great demonstrations of joy by several persons of rank, who had been banished by Phocas. From Abydus he sailed to Constantinople, where he engaged and utterly defeated the tyrant's fleet. Phocas took refuge in the palace; but one Photinus, whose wife he had formerly debauched, pursuing him with a party of soldiers, forced the gates, dragged the cowardly emperor from the throne, and having stripped him of the imperial robes, and clothed him with a black vest, carried him in chains to Heraclius, who commanded first his hands and feet, then his arms, and at last his head, to be cut off: the remaining part of his body was delivered up to the soldiers, who burnt it in the forum. We are told, that Heraclius having reproached him with his evil administration, he answered, with great calmness, "It is incumbent upon you to govern better." Such was the end of this cruel tyrant, after he had reigned seven years and some months.

PHOCILIDES, a Greek poet and philosopher of Miletus, flourished about 540 years before the Christian era. The poetical piece now extant, attributed to him, is not of his composition, but of another poet who lived in the reign of Adrian.

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PHOCION was a distinguished Athenian general and orator in the time of Philip II. of Macedon. His character is thus described in the *Ancient Universal History*. "He was too modest to solicit command, nor did he promote wars that he might raise his authority by them; though, taken either as a soldier, orator, statesman, or general, he was by far the most eminent Athenian of his time. As he was a most disinterested patriot, he could entertain no great affection for Philip; but as he perfectly well knew the disposition of his countrymen, and how unlikely they were long to support such measures as were necessary to humble the Macedonian power, he did not express himself vehemently, but chose rather to cultivate the esteem which on all occasions Philip showed for the state of Athens, as a mean of preserving her, when she should be reduced to that situation which he conceived they wanted virtue to prevent. From this character the reader will easily discern that Demosthenes and he could not well agree. The former was always warm, his language copious, and his designs extensive; and Phocion, on the other hand, was of a mild temper, delivered his opinion in very few words, and proposed schemes at once necessary and easy to be effected. Yet he seldom or never concurred with the people, but

spoke as poignantly against their vices as Demosthenes himself; insomuch that this orator once told him, 'The Athenians, Phocion, in some of their mad fits, will murder thee.' 'The same (answered he) may fall to thee, Demosthenes, if ever they come to be sober.'"

He was afterwards appointed to command the army which was sent to assist the Byzantines against Philip, whom he obliged to return to his own dominions. This truly great man, whom (though extremely poor) no sum could bribe to betray his country, and who at every risk on all occasions gave them sound advice, was at length accused by his ungrateful countrymen. This event happened in the year before Christ 318. He was sent to Athens by Polyperchon head of a faction in Macedonia, together with his friends, chained in carts, with this message, "That though he was convinced they were traitors, yet he left them to be judged by the Athenians as a free people." Phocion demanded whether they intended to proceed against him by form of law; and some crying out that they would, Phocion demanded how that could be if they were not allowed a fair hearing? but perceiving, by the clamour of the people, that no such thing was to be expected, he exclaimed, "As for myself, I confess the crime objected to me, and submit to the judgment of the law; but consider, O ye Athenians, what have these poor innocent men done that they should be involved in the same calamity with me?" The people replied with great vociferation, "They are your accomplices, and that is enough." Then the decree was read, adjudging them all to death, viz. Phocion, Nicocles, Aheudippus, Agamon, and Pythocles; these were present: Demetrius, Phalereus, Callimedes, Charicles, and others, were condemned in their absence. Some moved that Phocion might be tortured before he was put to death; nay, they were for bringing the rack into the assembly, and torturing him there. The majority, however, thought it enough if he was put to death, for which the decree was carried unanimously; some putting on garlands of flowers when they gave their votes. As he was going to execution, a person who was his intimate friend asked him if he had any message for his son? "Yes," replied Phocion; "tell him it is my last command that he forget how ill the Athenians treated his father."

The spleen of his enemies was not extinguished with his life: they passed a decree whereby his corpse was banished the Athenian territories; they likewise forbade any Athenians to furnish fire for his funeral pile. One Conopian took up the corpse, and carried it beyond Eleusina, where he borrowed some fire of a Megarian woman and burned it. A Megarian matron, who attended with her maid, raised on the place an honorary monument; and having gathered up the bones, carried them home, and buried them under her own hearth; praying at the same time thus to the Penates: "To you, O ye gods, guardians of this place, I commit the precious remains of the most excellent Phocion. Protect them, I beseech you, from all insults; and deliver them one day to be repositied in the sepulchre of his ancestors, when the Athenians shall become wiser." It was not long before this opportunity occurred. When the Athenians began to cool a little, and remember

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Phocis. the many services they had received from Phocion, they decreed him a statue of brass; ordered his bones to be brought back at the public expence; and decreed that his accusers should be put to death. Agnonides, who was principally concerned in that tragedy, suffered; but Epicurus and Demophilus, who were also accomplices in it, fled. However, Phocion's son met with them, and executed his revenge upon them; which was almost the only good action he ever performed, as he had a very small share of his father's abilities, and not any of his virtues. Such is the fickleness and such the injustice of popular governments; failings which, if we are to judge from universal experience, are absolutely inseparable from them.

PHOCIS, (Demosthenes, Strabo, Pausanias); a country of Greece, contained between Bœotia to the east and Locris to the west, but extending formerly from the Sinus Corinthiacus on the south to the sea of Eubœa on the north, and, according to Dionysius, as far as Thermopylæ; but reduced afterwards to narrower bounds. *Phocenses*, the people; *Phocicus*, the epithet, (Justin); *Bellum Phocicum*, the sacred war which the Thebans and Philip of Macedon carried on against them for plundering the temple at Delphi; and by which Philip paved the way to the sovereignty of all Greece, (Justin.) Its greatest length was from north to south, that is, from 38° 45' to 39° 20', or about 35 miles; but very narrow from east to west, not extending to 30 miles, that is, from 23° 10' to 23° 40' at the widest, but about 23 miles towards the Corinthian bay, and much narrower still towards the north. This country is generally allowed to have taken its name from Phocus the son of Ornytion, a native of Corinth; but having been soon after invaded by the Eginetæ, under the conduct of another Phocus, who was the son of Eacus king of Enopia, the memory of the first insensibly gave way to that of the second.

In Phocis there were many celebrated mountains, such as Cythæron, **HELICON**, and **PARNASSUS**. The last two we have already noticed in the order of the alphabet. Cythæron was consecrated to the muses as well as the other two, and was consequently much celebrated by the poets. Both it and Helicon contend with mount Parnassus for height and magnitude. There were no remarkable rivers in Phocis except Cephissus, which runs from the foot of Parnassus northward, and empties itself in the Pindus, which was near the boundary of that kingdom. It had several very considerable cities; such as Cyrra, Crissa, and **ANTECYRA**, which, according to Ptolemy, were on the sea coasts; and Pythia, Delphi, Daulis, Elatia, Ergosthenia, and Baulia, which were inland towns. Elatia was the largest and richest after Delphi.

Deucalion was king of that part of Phocis which lies about Parnassus, at the time that the Cecrops flourished in Attica; but the Phocians afterwards formed themselves into a commonwealth, to be governed by their general assemblies, the members of which were chosen from among themselves, and were changed as often as occasion required. Of the history of the Phocians but little is known till the time of the holy war, of which we have the following account in the *Ancient Universal History*.

“The Phocians having presumed to plough the territories of the city of Cyrra, consecrated to the Delphic god, were summoned by the other Grecian states before the court of the Amphictyons, where a considerable fine was imposed upon them for their sacrilege. They refused to pay it, on pretence that it was too large; and at the next assembly their dominions were adjudged confiscated to the use of the temple. This second sentence exasperated the Phocians still more; who, at the instigation of one Philomelus, or, as he is called by Plutarch, Philomedes, seized upon the temple, plundered it of its treasure, and held the sacred depositum for a considerable time. This second crime occasioned another assembly of the Amphictyons, the result of which was a formal declaration of war against the Phocians. The quarrel being become more general, the several states took part in it according to their inclinations or interest. Athens, Sparta, and some others of the Peloponnesians, declared for the Phocians; and the Thebans, Thessalians, Locrians, and other neighbouring states, against them. A war was commenced with great fury on both sides, and styled *the holy war*, which lasted ten years; during which the Phocians, having hired a number of foreign troops, made an obstinate defence, and would in all probability have held out much longer had not Philip of Macedon given the finishing stroke to their total defeat and punishment. The war being ended, the grand council assembled again, and imposed an annual fine of 60 talents upon the Phocians, to be paid to the temple, and continued till they had fully repaired the damage it had sustained from them; and, till this reparation should be made, they were excluded from dwelling in walled towns, and from having any vote in the grand assembly. They did not, however, continue long under this heavy sentence: their known bravery made their assistance so necessary to the rest, that they were glad to remit it; after which remission they continued to behave with their usual courage and resolution, and soon obliterated their former guilt.”

We cannot finish this article without mentioning more particularly Daulis, rendered famous, not so much for its extent or richness, as for the stature and prowess of its inhabitants; but still more for the inhuman repast which was served up to Tereus king of Thrace by the women of this city, by whom he was soon after murdered for the double injury he had done to his sister-in-law Philomela, daughter of Pandion king of Athens. See **PHILOMELA**.

PHŒBUS, one of the names given by ancient mythologists to the Sun, Sol, or Apollo. See **APOLLO**.

PHŒNICIA, or more properly **PHŒNICE**, the ancient name of a country lying between the 34th and 36th degrees of north latitude; bounded by Syria on the north and east, by Judæa on the south, and by the Mediterranean on the west. Whence it borrowed its name is not absolutely certain. Some derive it from one Phoenix; others from the Greek word *phœnix*, signifying a palm or date, as that tree remarkably abounded in this country. Some again suppose that Phœnice is originally a translation of the Hebrew word *Edom*, from the Edomites who fled thither in the days of David. By the contraction of Canaan it was also called

Phocis
||
Phœnicia

Phœnicia. called *Chna*, and anciently *Rhabbothin* and *Colpitis* (A). The Jews commonly named it *Canaan*; though some part of it, at least, they knew by the name of *Syrophœnicie* (B). Bochart tells us that the most probable etymology is *Phœne Anak*, i. e. "the descendants of Anak." Such were the names peculiar to this small country; though Phœnicie was sometimes extended to all the maritime countries of Syria and Judæa, and Canaan to the Philistines, and even to the Amalekites. On the contrary, these two names, and the rest, were most generally swallowed up by those of Palestine and Syria (C).

There is some disagreement among authors with respect to the northern limits of this country. Ptolemy makes the river Eleutherus the boundary of Phœnicie to the north; but Pliny, Mela, and Stephanus, place it in the island of Aradus, lying north of that river. Strabo observes, that some will have the river Eleutherus to be the boundary of Seleucis, on the side of Phœnicie and Cœlesyria. On the coast of Phœnicie, and south of the river Eleutherus, stood the following cities: SIMYRA, Orthosia, TRIPOLIS, Botrys, Byblus, Palæbyblus, Berytus, SIDON, SAREPTA, TYRUS, Palætyrus.

Phœnicie extended, according to Ptolemy, even beyond mount Carmelus; for that geographer places in Phœnicie not only Ecdippa and Ptolemais, but Syca-minum and Dæra, which stand south of that mountain. These, however, properly speaking, belonged to Palestine. We will not take upon us to mark out the bounds of the midland Phœnicie. Ptolemy reckons in it the following towns: Arca, Palæbyblus (Old Byblus), Gabala, and Cæseria Panice. This province was considerably extended in the times of Christianity; when, being considered as a province of Syria, it included not only Damascus but Palmyra also.

The soil of this country is good, and productive of many necessaries for food and clothing. The air is wholesome, and the climate agreeable. It is plentifully watered by small rivers; which, running down from mount Libanus, sometimes swell to an immoderate degree, either increased by the melting of the snows on that mountain, or by heavy rains. Upon these occasions they overflow, to the great danger and hinderance of the traveller and damage of the country. Among these rivers is that of ADONIS.

It is universally allowed that the Phœnicians were Canaanites (D) by descent: nothing is plainer or less

contested, and therefore it were time lost to prove it. *Phœnicia*. We shall only add, that their blood must have been mixed with that of foreigners in process of time, as it happens in all trading places; and that many strange families must have settled among them, who could consequently lay no claim to this remote origin, how much soever they may have been called Phœnicians, and reckoned of the same descent with the ancient proprietors.

The Phœnicians were governed by kings; and their territory, as small a slip as it was, included several kingdoms; namely, those of Sidon, Tyre, Aradus, Berytus, and Byblus. In this particular they imitated and adhered to the primitive government of their forefathers; who, like the other Canaanites, were under many petty princes, to whom they allowed the sovereign dignity, reserving to themselves the natural rights and liberties of mankind. Of their civil laws we have no particular system.

With regard to religion, the Phœnicians were the most gross and abominable idolaters. The Baal-berith, Baalzebub, Baalfamen, &c. mentioned in Scripture, were some of the Phœnician gods; as were also the Moloch, Ashtaroth, and Thammuz, mentioned in the sacred writings.—The word *Baal*, in itself an appellation, was no doubt applied to the true God, until he rejected it on account of its being so much profaned by the idolaters. The name was not appropriated to any particular deity among the idolatrous nations, but was common to many; however, it was generally imagined that one great God presided over all the rest. Among the Phœnicians this deity was named *Baal-famen*; whom the Hebrews would have called *Baal-shemim*, or the God of heaven. In all probability this was also the principal Carthaginian deity, though his Punic name is unknown. We have many religious rites of the Carthaginians handed down to us by the Greek and Roman writers; but they all bestowed names of their own gods upon those of the Carthaginians, which leads us to a knowledge of the correspondence between the characters of the Phœnician and European deities. The principal deity of Carthage, according to Diodorus Siculus, was Chronus or Saturn. The sacrifices offered up to him were children of the best families. Our author also tells us, that the Carthaginians had a brazen statue or colossus of this god, the hands of which were extended in act to receive, and bent downwards in such a manner, that the child laid thereon

(A) This last name is a translation of the first. *Rabbotsen* is in Hebrew a great gulph or bay. From *rabbotsen*, by changing the Hebrew *s* into the Greek *t*, comes *rabboten*; and, with a little variation, *rhabbothin*. *Kolpos*, is Greek also for a bay or gulph; whence it appears that *colpitis* or *colpites* is a translation of *rabbotsen*.

(B) Bochart supposes that the borderers, both upon the Phœnician and Syrian side, were called by the common name of Syrophœnicians, as partaking equally of both nations.

(C) Or rather Phœnicie, Palestine, and Syria, were promiscuously used for each other, and particularly the two former. Phœnicie and Palestine, says Stephanus Byzantinus, were the same. As for Syria, we have already observed, that in its largest extent it sometimes comprehended Phœnicie and Cœlesyria. Herodotus plainly confounds these three names; we mean, uses one for the other indifferently.

(D) Bochart insinuates that the Canaanites were ashamed of their name, on account of the curse denounced on their progenitor, and terrified by the wars so vigorously and successfully waged on them by the Israelites, purely because they were Canaanites; and that therefore, to avoid the ignominy of the one and the danger of the other, they abjured their old name, and changed it for Phœnicians, Syrians, Syrophœnicians, and Assyrians. Heidegger conjectures also that they were ashamed of their ancestor Canaan.

Phœnicia. thereon immediately fell down into a hollow where there was a fiery furnace. He adds also, that this inhuman practice seemed to confirm a tradition, handed down to the Greeks from very early antiquity, viz. that Saturn devoured his own children.

The goddess *Cœlestis*, or *Urania*, was held in the highest veneration by the Carthaginians. She is thought to have been the same with the queen of heaven mentioned in *Jeremiah*, the *Juno Olympia* of the Greeks. According to *Hesychius*, the same word applied in the Punic language both to *Juno* and *Venus*: Nay, the ancient Greeks frequently confound *Juno*, *Venus*, and *Diana* or the moon, all together; which is to be attributed to the Egyptians and Phœnicians, from whom they received their system of religion; who seem in the most ancient times to have had but one name for them all. Besides these there were several other deities of later date, who were worshipped among the Phœnicians, particularly those of *Tyre*, and consequently among the Carthaginians also. These were *Jupiter*, *Apollo*, *Mars*, and *Bacchus*. *Jupiter* was worshipped under the name of *Belus* or *Baal*. To him they addressed their oaths; and placed him for the most part, as there is reason to believe, at the head of their treaties. The same name was also given to the other two, whence they were frequently mistaken for one another. *Apollo* or the sun went either by this name simply, or by others of which this made a part.

The Carthaginian superstition, however, was not confined to these deities alone. They worshipped also the fire, air, and other elements; and had gods of rivers, meads, &c. Nay, they paid divine honours to the spirits of their heroes, and even to men and women themselves while yet in life; and in this adoration *Hannibal the Great* had for some time a share, notwithstanding the infamous conduct of his countrymen towards him at last. In order to worship those gods with more conveniency on all occasions, the Carthaginians had a kind of portable temples. These were only covered chariots, in which were some small images representing their favourite deities; and which were drawn by oxen. They were also a kind of oracle; and their responses were understood by the motion impressed upon the vehicle. This was likewise an Egyptian or Libyan custom; and *Tacitus* informs us that the ancient Germans had something of the same kind. The tabernacle of *Moloch* is thought to have been a machine of this kind; and it is not improbable that the whole was derived from the tabernacle of the Jews in the wilderness.

Besides all the deities above-mentioned, we still find another, named the *Dæmon* or *Genius* of Carthage, mentioned in the treaty made by *Philip of Macedon* and *Hannibal*. What this deity might be, we know not; however, it may be observed, that the pagan world in general believed in the existence of demons, or intelligences who had a kind of middle nature between gods and men, and to whom the administration of the world was in a great measure committed. Hence it is no wonder that they should have received religious honours. For when once mankind were possessed with the opinion that they were the ministers of the gods, and trusted with the dispensation of their favours, as well as the infliction of their punishments, it is natural

to suppose that they would be desirous of making their *Phœnicia* addresses to them. See *ASTARTE* and *POLYTHEISM*.

Herodotus supposes the Phœnicians to have been circumcised; but *Josephus* asserts, that none of the nations included under the vague name of *Palestine* and *Syria* used that rite, the Jews excepted; so that if the Phœnicians had anciently that custom, they came in time to neglect it, and at length wholly laid it aside. They abstained however from the flesh of swine.

Much is said of their arts, sciences, and manufactures; but as what we find concerning them is couched in general terms only, we cannot descant on particulars. The *Sidonians*, under which denomination we comprehend the Phœnicians in general, were of a most happy genius. They were from the beginning addicted to philosophical exercises of the mind; insomuch that a *Sidonian*, by name *Moschus*, taught the doctrine of atoms before the Trojan war: and *Abomenus* of *Tyre* puzzled *Solomon* by the subtilty of his questions. *Phœnicia* continued to be one of the seats of learning, and both *Tyre* and *Sidon* produced their philosophers of later ages; namely, *Boethus* and *Diodatus* of *Sidon*, *Antipater* of *Tyre*, and *Appollonius* of the same place; who gave an account of the writings and disciples of *Zeno*. For their language, see *PHILOLOGY*, n° 61. As to their manufactures, the glass of *Sidon*, the purple of *Tyre*, and the exceeding fine linen they wove, were the product of their own country, and their own invention; and for their extraordinary skill in working metals, in hewing timber and stone; in a word, for their perfect knowledge of what was solid, great, and ornamental in architecture—we need only put the reader in mind of the large share they had in erecting and decorating the temple at *Jerusalem* under their king *Hiram*. Their fame for taste, design, and ingenious invention, was such, that whatever was elegant, great, or pleasing, whether in apparel, vessels, or toys, was distinguished by way of excellence with the epithet of *Sidonian*.

The Phœnicians were likewise celebrated as merchants, navigators, and planters of colonies in foreign parts. As merchants, they may be said to have engrossed all the commerce of the western world: as navigators, they were the boldest, the most experienced, and greatest discoverers, of the ancient times: they had for many ages no rivals. In planting colonies they exerted themselves so much, that, considering their habitation was little more than the slip of ground between mount *Libanus* and the sea, it is surprising how they could furnish such supplies of people, and not wholly depopulate their native country.

It is generally supposed that the Phœnicians were induced to deal in foreign commodities by their neighbourhood with the *Syrians*, who were perhaps the most ancient of those who carried on a considerable and regular trade with the more eastern regions: and this conjecture appears probable at least; for their own territory was but small, and little able to afford any considerable exports, if we except manufactures: but that their manufactures were anyways considerable till they began to turn all the channels of trade into their own country, it is hard to believe. In *Syria*, which was a large country, they found store of productions of the natural growth of that soil, and many choice and useful commodities brought from the east. Thus, having

Phœnicia a safe coast, with convenient harbours, on one side, and excellent materials for ship-building on the other; perceiving how acceptable many commodities that Syria furnished would be in foreign parts, and being at the same time, perhaps, shown the way by the Syrians themselves, who may have navigated the Mediterranean—they turned all their thoughts to trade and navigation, and by an uncommon application soon eclipsed their masters in that art.

It were in vain to talk of the Edomites, who fled hither in David's time; or to inquire why Herodotus supposes the Phœnicians came from the Red Sea: their origin we have already seen. That some of the Edomites fled into this country in the days of David, and that they were a trading people, is very evident: what improvements they brought with them into Phœnice, it is hard to say; and by the way, it is as difficult to ascertain their numbers. In all probability they brought with them a knowledge of the Red Sea, and of the south parts of Arabia, Egypt, and Ethiopia; and by their information made the Phœnicians acquainted with those coasts; by which means they were enabled to undertake voyages to those parts, for Solomon, and Pharaoh Necho, king of Egypt.

Their whole thoughts were employed on schemes to advance their commerce. They affected no empire but that of the sea; and seemed to aim at nothing but the peaceable enjoyment of their trade. This they extended to all the known parts they could reach; to the British isles, commonly understood by the Cassiterides; to Spain, and other places in the ocean, both within and without the Straits of Gibraltar; and, in general, to all the ports of the Mediterranean, the Black Sea, and the Lake Mæotis. In all these parts they had settlements and correspondents, from which they drew what was useful to themselves, or might be so to others; and thus they exercised the three great branches of trade, as it is commonly divided into importation, exportation, and transportation, in full latitude. Such was their sea-trade; and for that which they carried on by land in Syria, Mesopotamia, Assyria, Babylonia, Persia, Arabia, and even in India, it was of no less extent, and may give us an idea of what this people once was, how rich and how deservedly their merchants are mentioned in Scripture as equal to princes. Their country was, at that time, the great warehouse, where every thing that might either administer to the necessities or luxury of mankind was to be found; which they distributed as they judged would be best for their own interest. The purple of Tyre, the glass of Sidon, and the exceeding fine linen made in this country, together with other curious pieces of art in metals and wood, already mentioned, appear to have been the chief and almost only commodities of Phœnice itself. Indeed their territory was so small, that it is not to be imagined they could afford to export any of their own growth; it is more likely that they rather wanted than abounded with the fruits of the earth.

Having thus spoken in general terms of their trade, we shall now touch upon their shipping and some things remarkable in their navigation. Their larger embarkations were of two sorts; they divided them into round ships or gauli; and long ships, galleys, or triremes. When they drew up in line of battle, the gauli were disposed at a small distance from each other in the

wings, or in the van and the rear: their triremes were contracted together in the centre. If, at any time, they observed that a stranger kept them company in their voyage, or followed in their track, they were sure to get rid of him if they could, or deceive him if possible; in which policy they went so far, as to venture the loss of their ships, and even their lives; so jealous were they of foreigners, and so tenaciously bent on keeping the whole trade to themselves. In order to discourage other nations from engaging in commerce, they practised piracy, or pretended to be at war with such as they met when they thought themselves strongest. This was but a natural stroke of policy in people who grasped at the whole commerce of the then known world. We must not forget here the famous fishery of Tyre, which so remarkably enriched that city in particular. See ASTRONOMY, n° 7. OPHIR, and TYRE.

PHOENICOPTERUS, or FLAMINGO, in ornithology, a genus of birds belonging to the order of grallæ. The beak is naked, toothed, and bent as if it was broken; the nostrils are linear; the feet are palmated, and four-toed. There is but one species; viz. the Bahamensis of Catesby, a native of Africa and America. Plate CCCXCH.

This bird resembles the heron in shape, excepting the bill, which is of a very singular form. It is two years old before it arrives at its perfect colour; and then it is entirely red, excepting the quill-feathers, which are black. A full-grown one is of equal weight with a wild duck; and when it stands erect, it is five feet high. The feet are webbed. The flesh is delicate; and most resembles that of a partridge in taste. The tongue, above any other part, was in the highest esteem with the luxurious Romans. These birds make their nests on hillocks in shallow water; on which they sit with their legs extended down, like a man sitting on a stool. They breed on the coasts of Cuba and the Bahama islands in the West Indies; and frequent salt-water only. By reason of the particular shape of its bill, this bird, in eating, twists its neck from side to side, and makes the upper mandible touch the ground. They are very stupid, and will not rise at the report of a gun; nor is it any warning to those who survive, that they see others killed by their side; so that, by keeping himself out of sight, a fowler may kill as many as he pleases.

These birds prefer a warm climate. In the old continent they are not often met with beyond 40 degrees north or south. They are met with everywhere on the African coast and adjacent isles, to the Cape of Good Hope; and sometimes on the coasts of Spain, Italy, and those of France lying in the Mediterranean Sea; being at times found at Marseilles, and for some way up the Rhone. In some seasons they frequent Aleppo and the parts adjacent. They are seen also on the Persian side of the Caspian Sea, and from thence along the western coast as far as the Wolga; tho' this is at uncertain times, and chiefly in considerable flocks coming from the north-east, mostly in October and November; but so soon as the wind changes they totally disappear. They breed in the Cape Verd isles, particularly in that of Sal. They go for the most part together in flocks, except in breeding time. Dampier says, that, with two more in company, he killed 14 at once, which was effected by secreting themselves; for

Phœnicop-
te us,
Phœnix.

for they are so very shy, that they will by no means suffer any one to approach openly near enough to shoot them. Kolben tells us, that they are very numerous at the Cape; keeping in the day on the borders of the lakes and rivers, and lodging themselves at night in the long grass on the hills. They are also common to various places in the warmer parts of America, frequenting the same latitudes as in other quarters of the world; being found at Peru, Chili, Cayenne, and the coast of Brasil, as well as the various islands of the West Indies. Sloane found them in Jamaica; but particularly at the Bahama Islands and at Cuba, where they breed. When seen at a distance, they appear as a regiment of soldiers, being ranged along-side one another, on the borders of the rivers, searching for food; which chiefly consists of small fish or the eggs of them; and of water-insects, which they search after by plunging in the bill and part of the head, from time to time trampling with their feet to muddy the water, that their prey may be raised from the bottom. Whilst they are feeding, one of them is said to stand sentinel, and the moment he sounds the alarm the whole flock takes wing. This bird, when at rest, stands on one leg, the other being drawn up close to the body, with the head placed under the wing on that side of the body it stands on.

They are sometimes caught young, and are brought up tame; but are always impatient of cold: and in this state will seldom live a great while, gradually losing their colour, flesh, and appetite, and dying for want of that food which in a state of nature at large they were abundantly supplied with.

PHOENIX, in astronomy. See there, n° 406.

PHOENIX, the *Great Palm*, or *Date-tree*; a genus of plants belonging to the order of palmæ. There is only one species, viz. the *dactylifera*, or common date-tree, a native of Africa and the eastern countries, where it grows to 50, 60, and 100 feet high. The trunk is round, upright, and studded with protuberances, which are the vestiges of the decayed leaves. From the top issues forth a cluster of leaves or branches eight or nine feet long, extending all round like an umbrella, and bending a little towards the earth. The bottom part produces a number of stalks like those of the middle, but seldom shooting so high as four or five feet. These stalks, says Adanson, diffuse the tree very considerably; so that, wherever it naturally grows in forests, it is extremely difficult to open a passage through its prickly leaves. The date-tree was introduced into Jamaica soon after the conquest of the island by the Spaniards. There are, however, but few of them in Jamaica at this time. The fruit is somewhat in the shape of an acorn. It is composed of a thin, light, and glossy membrane, somewhat pellucid and yellowish; which contains a fine, soft, and pulpy fruit, which is firm, sweet, and somewhat vinous to the taste, excellent, and wholesome; and within this is inclosed a solid, tough, and hard kernel, of a pale grey colour on the outside, and finely marbled within like the nutmeg. For medicinal use dates are to be chosen large, full, fresh, yellow on the surface, soft and tender, not too much wrinkled; such as have a vinous taste, and do not rattle when shaken. They are produced in many parts of Europe, but never ripen perfectly there. The best are brought from Tunis; they are also very fine and good in Egypt and in many parts of the east.

Those of Spain and France look well; but are never perfectly ripe, and very subject to decay. They are preserved three different ways; some pressed and dry; others pressed more moderately, and again moistened with their own juice; and others not pressed at all, but moistened with the juice of other dates, as they are packed up, which is done in baskets or skins. Those preserved in this last way are much the best. Dates have always been esteemed moderately strengthening and astringent.

Though the date-tree grows everywhere indiscriminately on the northern coasts of Africa, it is not cultivated with care, except beyond Mount Atlas; because the heat is not sufficiently powerful along the coasts to bring the fruits to proper maturity. We shall here extract some observations from Mr Des Fontaines respecting the manner of cultivating it in Barbary, and on the different uses to which it is applied. All that part of the Zaara which is near Mount Atlas, and the only part of this vast desert which is inhabited, produces very little corn; the soil being sandy, and burnt up by the sun, is almost entirely unfit for the cultivation of grain, its only productions of that kind being a little barley, maize, and sorgo. The date-tree, however, supplies the deficiency of corn to the inhabitants of these countries, and furnishes them with almost the whole of their subsistence. They have flocks of sheep; but as they are not numerous, they preserve them for the sake of their wool; besides, the flesh of these animals is very unwholesome food in countries that are excessively warm; and these people, though ignorant, have probably been enabled by experience to know that it was salutary for them to abstain from it. The date trees are planted without any order, at the distance of 12 feet one from the other, in the neighbourhood of rivulets and streams which issue from the sand. Forests of them may be seen here and there, some of which are several leagues in circumference. The extent of these plantations depends upon the quantity of water which can be procured to water them; for they require much moisture. All these forests are intermixed with orange, almond, and pomegranate trees, and with vines which twist round the trunks of the date trees; and the heat is strong enough to ripen the fruit, though they are never exposed to the sun.

Along the rivulets and streams, dykes are erected to stop the course of their waters, in order that they may be distributed amongst the date trees by means of small canals. The number of canals is fixed for each individual; and in several cantons, to have a right to them, the proprietors are obliged to pay an annual sum proportionable to the number and extent of their plantations. Care is taken to till the earth well, and to raise a circular border around the root of each tree, that the water may remain longer and in larger quantity. The date trees are watered in every season, but more particularly during the great heats of summer.

It is generally in winter that new plantations of this tree are formed. For this purpose those who cultivate them take shoots of those which produce the best dates, and plant them at a small distance one from the other. At the end of three or four years these shoots, if they have been properly taken care of, begin to bear fruit; but this fruit is as yet dry, without sweetness,

Phœnix.

Phoenix. and even without kernels; they never reach the highest degree of perfection of which they are susceptible till they are about 15 or 20 years old.

These plants are however produced from the seeds taken out of the fruit, provided they are fresh. They should be sown in pots filled with light rich earth, and plunged into a moderate hot-bed of tanners bark, which should be kept in a moderate temperature of heat, and the earth frequently refreshed with water. When the plants are come up to a proper size, they should be each planted in a separate small pot, filled with the same light earth, and plunged into a hot-bed again, observing to refresh them with water, as also to let them have air in proportion to the warmth of the season and the bed in which they are placed. During the summer-time they should remain in the same hot bed; but in the beginning of August, they should have a great share of air to harden them against the approach of winter; for if they are too much forced, they will be so tender as not to be preserved through the winter without much difficulty, especially if you have not the conveniency of a bark-stove to keep them in. The soil in which these plants should be placed, must be composed in the following manner, viz. half of light fresh earth taken from a pasture-ground, the other half sea-sand and rotten dung or tanners bark in equal proportion; these should be carefully mixed, and laid in a heap three or four months at least before it is used, but should be often turned over to prevent the growth of weeds, and to sweeten the earth.

The trees, however, which spring from seed never produce so good dates as those that are raised from shoots; they being always poor and ill tasted. It is undoubtedly by force of cultivation, and after several generations, that they acquire a good quality.

The date trees which have been originally sown, grow rapidly, and we have been assured that they bear fruit in the fourth or fifth year. Care is taken to cut the inferior branches of the date tree in proportion as they rise; and a piece of the root is always left of some inches in length, which affords the easy means of climbing to the summit. These trees live a long time, according to the account of the Arabs; and in order to prove it, they say that when they have attained to their full growth, no change is observed in them for the space of three generations.

The number of females which are cultivated is much superior to that of the males, because they are much more profitable. The sexual organs of the date tree grow, as is well known, upon different stalks, and these trees flower in the months of April and May, at which time the Arabs cut the male branches to im-

pregnate the female. For this purpose, they make *Phoenix.* an incision in the trunk of each branch which they wish to produce fruit, and place in it a stalk of male flowers; without this precaution the date tree would produce only abortive fruit (A). In some cantons the male branches are only shaken over the female. The practice of impregnating the date tree in this manner is very ancient. Pliny describes it very accurately in that part of his work where he treats of the palm tree.

There is scarcely any part of the date tree which is not useful. The wood, though of a spongy texture, lasts such a number of years, that the inhabitants of the country say it is incorruptible. They employ it for making beams and instruments of husbandry; it burns slowly, but the coals which result from its combustion are very strong, and produce a great heat.

The Arabs strip the bark and fibrous parts from the young date trees, and eat the substance, which is in the centre; it is very nourishing, and has a sweet taste: it is known by the name of the marrow of the date-tree. They eat also the leaves, when they are young and tender, with lemon juice; the old ones are laid out to dry, and are employed for making mats and other works of the same kind, which are much used, and with which they carry on a considerable trade in the interior parts of the country. From the sides of the stumps of the branches which have been left arise a great number of delicate filaments, of which they make ropes, and which might serve to fabricate cloth.

Of the fresh dates and sugar, says Hasselquist, the Egyptians make a conserve, which has a very pleasant taste. In Egypt they use the leaves as fly-flaps, for driving away the numerous insects which prove so troublesome in hot countries. The hard boughs are used for fences and other purposes of husbandry; the principal stem for building. The fruit, before it is ripe, is somewhat astringent; but when thoroughly mature, is of the nature of the fig. The Senegal dates are shorter than those of Egypt, but much thicker in the pulp, which is said to have a sugary agreeable taste, superior to that of the best dates of the Levant.

A white liquor, known by the name of *milk*, is drawn also from the date tree. To obtain it, all the branches are cut from the summit of one of these trees, and after several incisions have been made in it, they are covered with leaves, in order that the heat of the sun may not dry it.

The sap drops down into a vessel placed to receive it, at the bottom of a circular groove, made below the

(A) The celebrated Linnæus, in his Dissertation on the Sexes of Plants, speaking of the date tree, says, "A female date-bearing palm flowered many years at Berlin without producing any seeds; but the Berlin people taking care to have some of the blossoms of the male tree, which was then flowering at Leipzig, sent to them by the post, they obtained fruit by these means; and some dates, the offspring of this impregnation, being planted in my garden, sprung up, and to this day continue to grow vigorously. Kœmpfer formerly told us, how necessary it was found by the oriental people, who live upon the produce of palm-trees, and are the true *Lotophagi*, to plant some male trees among the females, if they hoped for any fruit: hence it is the practice of those who make war in that part of the world to cut down all the male palms, that a famine may afflict their proprietors; sometimes even the inhabitants themselves destroy the male trees when they dread an invasion, that their enemies may find no sustenance in the country."

Phoenix the incisions. The milk of the date tree has a sweet and agreeable taste when it is new; it is very refreshing, and it is even given to sick people to drink, but it generally turns sour at the end of 24 hours. Old trees are chosen for this operation, because the cutting of the branches, and the large quantity of sap which flows from them, greatly exhaust them, and often cause them to decay.

The male flowers of the date tree are also useful. They are eaten when still tender, mixed up with a little lemon juice. They are reckoned to be very provocative: the odour which they exhale is probably the cause of this property being ascribed to them.

These date trees are very lucrative to the inhabitants of the desert. Some of them produce 20 bunches of dates; but care is always taken to lop off a part of them, that those which remain may become larger; 10 or 12 bunches only are left on the most vigorous trees.

It is reckoned that a good tree produces, one year with another, about the value of 10 or 12 shillings to the proprietor. A pretty considerable trade is carried on with dates in the interior part of the country, and large quantities of them are exported to France and Italy. The crop is gathered towards the end of November. When the bunches are taken from the tree, they are hung up in some very dry place where they may be sheltered and secure from insects.

Dates afford wholesome nourishment, and have a very agreeable taste when they are fresh. The Arabs eat them without seasoning. They dry and harden them in the sun, to reduce them to a kind of meal, which they lay up in store to supply themselves with food during the long journeys which they often undertake across their deserts. This simple food is sufficient to nourish them for a long time.—The inhabitants of the Zaara procure also from their dates a kind of honey which is exceedingly sweet. For this purpose they choose those which have the softest pulp; and having put them into a large jar with a hole in the bottom, they squeeze them by placing over them a weight of eight or ten pounds.—The most fluid part of the substance, which drops through the hole, is what they call the *honey* of the date.

Even the stones, though very hard, are not thrown away. They give them to their camels and sheep as food, after they have bruised them or laid them to soften in water.

The date, as well as other trees which are cultivated, exhibits great variety in its fruit, with respect to shape, size, quality, and even colour. There are reckoned to be at least twenty different kinds. Dates are very liable to be pierced by worms, and they soon corrupt in moist or rainy weather.

From what has been said, it may easily be perceived, that there is, perhaps, no tree whatever used for so many and so valuable purposes as the date tree.

PHOENIX, in ornithology, a bird famous in antiquity, but generally looked upon by the moderns as fabulous. The ancients speak of this bird as single, or the only one of its kind; they describe it as of the size of an eagle; its head finely crested with a beautiful plumage, its neck covered with feathers of a gold colour, and the rest of its body purple, only the tail white, and the eyes sparkling like stars: they hold,

that it lives 500 or 600 years in the wilderness; that when thus advanced in age, it builds itself a pile of sweet wood and aromatic gums, and fires it with the waisting of its wings, and thus burns itself; and that from its ashes arises a worm, which in time grows up to be a phoenix. Hence the Phœnicians gave the name of *phœnix* to the palm-tree; because when burnt down to the root it rises again fairer than ever.

In the sixth book of the Annals of Tacitus, sect. 28. it is observed that, in the year of Rome 787, the phoenix revisited Egypt; which occasioned among the learned much speculation. This being is sacred to the sun. Of its longevity the accounts are various. The common persuasion is, as we have mentioned above, that it lives 500 years; though by some the date is extended to 1461. The several eras when the phoenix has been seen are fixed by tradition. The first, we are told, was in the reign of Sesostris; the second in that of Amasis; and, in the period when Ptolemy the third of the Macedonian race was seated on the throne of Egypt, another phoenix directed its flight towards Heliopolis. When to these circumstances are added the brilliant appearance of the phoenix, and the tale that it makes frequent excursions with a load on its back, and that when, by having made the experiment through a long tract of air, it gains sufficient confidence in its own vigour, it takes up the body of its father and flies with it to the altar of the sun to be there consumed; it cannot but appear probable, that the learned of Egypt had enveloped under this allegory the philosophy of comets.

PHOENIX, son of Amyntor king of Argos by Cleobule or Hippodamia, was preceptor to young Achilles. His father having proved faithless to his wife, through fondness for a concubine called *Clytia*, Cleobule, who was jealous of him, persuaded her son Phoenix to ingratiate himself with his father's mistress. Phoenix easily succeeded; but Amyntor discovering his intrigues, he drew a curse upon him, and the son was soon after deprived of his sight by divine vengeance. Some say that Amyntor himself put out his son's eyes, which so cruelly provoked him that he meditated the death of his father. Reason and piety, however, prevailed over passion; and that he might not become a parricide, Phoenix fled from Argos to the court of Peleus king of Phthia. Here he was treated with tenderness; Peleus carried him to Chiron, who restored him to his eye-sight; soon after which he was made preceptor to Achilles, his benefactor's son. He was also presented with the government of many cities, and made king of the Dolopes. He went with his pupil to the Trojan war; and Achilles was ever grateful for the instructions and precepts which he had received from him. After the death of Achilles, Phoenix, with others, was commissioned by the Greeks to return into Greece, to bring to the war young Pyrrhus. This commission he successfully performed; and after the fall of Troy, he returned with Pyrrhus, and died in Thrace. He was buried, according to Strabo, near Trachiniae, where a small river in the neighbourhood received the name of *Phœnix*. There was another Phoenix, son of Agenor, by a nymph who was called *Telephassa*, according to Apollodorus and Moschus, or, according to others, *Epimêdusa*, *Perimêda*, or *Agriope*. He was, like his brother Cadmus, and Cilix, sent by his

Phoenix

Pholas. his father in pursuit of his sister Europa, whom Jupiter had carried away under the form of a bull; and when his inquiries proved unsuccessful, he settled in a country, which, according to some, was from him called *Phanicia*. From him, as some suppose, the Carthaginians were called *Pani*.

Plate CCCXCII. PHOLAS, a genus of insects, belonging to the order of vermes testacea. The shell is double-valved and divaricated; the cardo is turned backwards, and connected by a cartilage. There are six species, distinguished by the figure of their shells.

The word *pholas* is derived from the Greek, and signifies something which lies hid. This name they derive from their property of making themselves holes in the earth, sand, wood, or stone, and living in them. The means of their getting there, however, are as yet entirely unknown. All that we can know with certainty is, that they must have penetrated these substances when very small; because the entrance of the hole in which the pholas lodges is always much less than the inner part of it, and indeed than the shell of the pholas itself. Hence some have supposed that they were hatched in holes accidentally formed in stones, and that they naturally grew of such a shape as was necessary to fill the cavity.

The holes in which the pholades lodge are usually twice as deep, at least, as the shells themselves are long; the figure of the holes is that of a truncated cone, excepting that they are terminated at the bottom by a rounded cavity, and their position is usually somewhat oblique to the horizon. The openings of these holes are what betray the pholas being in the stone; but they are always very small in proportion to the size of the fish. There seems to be no progressive motion of any animal in nature so slow as that of the pholas; it is immersed in the hole, and has no movement except a small one towards the centre of the earth; and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only moves downward, sinking itself deeper in the stone as it increases itself in bulk. That part by means of which it performs this, is a fleshy substance placed near the lower extremity of the shell; it is of the shape of a lozenge, and is considerably large in proportion to the size of the animal; and though it be of a soft substance, it is not to be wondered at that in so long a time it is able, by constant work, to burrow into a hard stone. The manner of their performing this may be seen by taking one of them out of the stone, and placing it upon some soft clay; for they will immediately get to work in bending and extending that part allotted to dig for them, and in a few hours they will bury themselves in the mud in as large a hole as they had taken many years to make in the stone. They find little resistance in so soft a substance; and the necessity of their hiding themselves evidently makes them hasten their work. The animal is lodged in the lower half of the hole in the stone, and the upper half is filled up by a pipe of a fleshy substance and conic figure, truncated at the end: this they usually extend to the orifice of the hole, and place on a level with the surface of the stone; but they seldom extend it any farther than this. The pipe, though it appears single, is in reality composed of two pipes, or at least it is composed of two parts separated

by a membrane. The use of this pipe or proboscis is the same with that of the proboscis of other shell-fish, to take in sea-water into their bodies, and afterwards to throw it out again. In the middle of their bodies they have a small green vessel, the use of which has not yet been discovered. This, when plunged in spirit-of-wine, becomes of a purple colour: but its colour on linen will not become purple in the sun like that of the murex; and even if it would, its quantity is too small to make it worth preserving.

The pholas is remarkable for its luminous quality. That this fish is luminous was noticed by Pliny, who observes that it shines in the mouth of the person who eats it; and if it touch his hands or clothes, it makes them luminous. He also says that the light depends upon its moisture. The light of this fish has furnished matter for various observations and experiments to M. Reaumur and the Bolognian academicians, especially Beccarius, who took so much pains with the subject of phosphoreal light.

M. Reaumur observes, that whereas other fishes give light when they tend to putrescence, this is more luminous in proportion to its being fresh; that when they are dried, their light will revive if they be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded.

The attention of the Bolognian academicians was engaged to this subject by M. F. Marfilius in 1724, who brought a number of these fishes, and the stones in which they were inclosed, to Bologna, on purpose for their examination.

Beccarius observed, that though this fish ceased to shine when it became putrid, yet that in its most putrid state it would shine, and make the water in which it was immersed luminous when it was agitated. Galeatius and Montius found that wine or vinegar extinguished this light; that in common oil it continued some days, but in rectified spirit of wine or urine hardly a minute.

In order to observe in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water rendered luminous by these fishes increased in light till the heat arrived to 45°, but that it then became suddenly extinct, and could not be revived again.

In the experiments of Beccarius, a solution of sea-salt increased the light of the luminous water; a solution of nitre did not increase it quite so much. Sal ammoniac diminished it a little, oil of tartar *per deliquium* nearly extinguished it, and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, ceruse, or sugar, became more luminous. He also tried the effects of it when poured upon various other substances, but there was nothing very remarkable in them. Afterwards, using luminous milk, he found that oil of vitriol extinguished the light, but that of tartar increased it.

This gentleman had the curiosity to try how differently coloured substances were affected by this kind of light; and having, for this purpose, dipped several ribbons in it, the white came out the brightest, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however,

Pholas,
Pholeys.

however, any particular colour, but only light, that was perceived in this case. He then dipped boards painted with the different colours, and also glass tubes filled with substances of different colours, in water rendered luminous by the fishes. In both these cases, the red was hardly visible, the yellow was the brightest, and the violet the dullest. But on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glasses, the blue was inferior to the green.

Of all the liquors to which he put the pholades, milk was rendered the most luminous. A single pholas made seven ounces of milk so luminous, that the faces of persons might be distinguished by it, and it looked as if it was transparent.

Air appeared to be necessary to this light; for when Beccarius put the luminous milk into glass tubes, no agitation would make it shine unless bubbles of air were mixed with it. Also Montius and Galeatius found, that, in an exhausted receiver, the pholas lost its light, but the water was sometimes made more luminous; which they ascribed to the rising of bubbles of air through it.

Beccarius, as well as Reaumur, had many schemes to render the light of these pholades permanent. For this purpose he kneaded the juice into a kind of paste with flour, and found that it would give light when it was immersed in warm water; but it answered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than six months, but in honey it had lasted above a year; and then it would, when plunged in warm water, give as much light as ever it had done. See Barbut's *Genera Verminum*, p. 14. &c.

PHOLEYS, or FOULIES, are a people of Africa, of very peculiar manners. Some authors tell us, that the kingdom of Pholey, from whence they derive their name, is divided from that of Jaloff by a lake called in the language of the Mundingoes *Cayor*; and that it stretches from east to west about 180 miles; but that, though it extends a great way south, its limits in that direction are not exactly ascertained.

Payne's
Geography,
Vol. I.
p. 442.

Mr Moore, however, gives a very different account, and says, that the Pholeys live in clans, build towns, and are in every kingdom and country on each side the river; yet are not subject to any of the kings of the country, though they live in their territories; for if they are used ill in one nation, they break up their towns, and remove to another. They have chiefs of their own, who rule with such moderation, that every act of government seems rather an act of the people than of one man. This form of government is easily administered, because the people are of a good and quiet disposition, and so well instructed in what is just and right, that a man who does ill exposes himself to universal contempt.

The natives of all these countries, not being avaricious of land, desire no more than they can use; and as they do not plough with horses or other cattle, they can use but very little; and hence the kings willingly allow the Pholeys to live in their dominions, and cultivate the earth.

The Pholeys have in general a tawney complexion, though many of them are of as deep a black as the

Mundingoes; and it is supposed that their alliances with the Moors have given them the mixed colour between the true olive and the black. They are rather of a low stature, but have a genteel and easy shape, with an air peculiarly delicate and agreeable.

Though they are strangers in the country, they are the greatest planters in it. They are extremely industrious and frugal, and raise much more corn and cotton than they consume, which they sell at reasonable rates; and are so remarkable for their hospitality, that the natives esteem it a blessing to have a Pholey town in their neighbourhood; and their behaviour has gained them such reputation, that it is esteemed infamous for any one to treat them in an inhospitable manner. Their humanity extends to all, but they are doubly kind to people of their race; and if they know of any one of their body being made a slave, they will readily redeem him. As they have plenty of food, they never suffer any of their own people to want; but support the old, the blind, and the lame, equally with the others.

These people are seldom angry; and Mr Moore observes that he never heard them abuse each other; yet this mildness is far from proceeding from want of courage, they being as brave as any people of Africa, and very expert in the use of their arms, which are javelins, cutlasses, bows and arrows, and upon occasion guns. They usually settle near some Mundingoe town, there being scarce any of note up the river that has not a Pholey town near it. Most of them speak Arabic, which is taught in their schools; and they are able to read the Koran in that language, though they have a vulgar tongue called *Pholey*. They are strict Mahometans, and scarce any of them will drink brandy, or any thing stronger than sugar and water.

They are so skilful in the management of cattle, that the Mundingoes leave theirs to their care. The whole herd belonging to a town feed all day in the savannahs, and after the crop is off, in the rice-grounds. They have a place without each town for their cattle, surrounded by a circular hedge, and within this enclosure they raise a stage about eight feet high, and eight or ten feet wide, covered with a thatched roof; all the sides are open, and they ascend to it by a ladder. Round this stage they fix a number of stakes, and when the cattle are brought up at night, each beast is tied to a separate stake with a strong rope made of the bark of trees. The cows are then milked, and four or five men stay upon the stage all night with their arms to guard them from the lions, tigers, and other wild beasts. Their houses are built in a very regular manner, they being round structures, placed in rows at a distance from each other to avoid fire, and each of them has a thatched roof somewhat resembling a high-crowned hat.

They are also great huntsmen, and not only kill lions, tigers, and other wild beasts, but frequently go 20 or 30 in a company to hunt elephants; whose teeth they sell, and whose flesh they smoke-dry and eat, keeping it for several months together. As the elephants here generally go in droves of 100 or 200, they do great mischief by pulling up the trees by the roots, and trampling down the corn; to prevent which, when the natives have any suspicion of their coming, they make fires round their corn to keep them out.

They

Pholeys.

Pholis
||
Phormium.

They are almost the only people who make butter, and sell cattle at some distance up the river. They are very particular in their dress, and never wear any other clothes but long robes of white cotton, which they make themselves. They are always very clean, especially the women, who keep their houses exceedingly neat. They are, however, in some particulars very superstitious; for if they chance to know that any person who buys milk of them boils it, they will from thenceforth on no consideration sell that person any more, from their imagining that boiling the milk makes the cows dry.

PHOLIS, in natural history, is the name of a genus of fossils of the class of gypsums or plaster-stones. Its distinguishing characters are, that the bodies of it are tolerably hard, composed of particles somewhat broad, and of a bright crystalline lustre. The name is derived from *φολις*, a *scale* or *small flake*, because they are composed of particles of that form.

The species of this genus are very valuable, and perhaps the most so of all the gypsums, because they burn to the best and finest plaster, but so far as is yet known, there are but two of them: the fine plaster-stone of Montmartre in France, called by us *plaster of Paris stone* and *parget*; and the other, the coarser and somewhat reddish kind, common in many parts of England, and called *ball plaster*. See *PLASTER of Paris*.

PHOLIS, in ichthyology, is the name of a small anguilliform fish. The back is brown, the belly is white, the whole back and sides are spotted, and the skin is soft, free of scales, but with a tough mucilaginous matter like the eel. This species most of all approaches to the *alauda*; and tho' usually larger, yet Mr Ray doubts whether it really differs from it in any thing essential; the distinction is its colour, which though a very obvious is certainly a very precarious one.

PHONICS, the doctrine or science of sounds, otherwise called *ACOUSTICS*. See that article.

PHORMIUM, FLAX-PLANT, (*Phormium tenax*, Forst.) is a name which we may give to a plant that serves the inhabitants of New Zealand instead of hemp and flax. Of this plant there are two sorts; the leaves of both resemble those of flags, but the flowers are smaller, and their clusters more numerous; in one kind they are yellow, and in the other a deep red. Of the leaves of these plants, with very little preparation, they make all their common apparel, and also their strings, lines, and cordage, for every purpose; which are so much stronger than any thing we can make with hemp, that they will not bear a comparison.—From the same plant, by another preparation, they draw long slender fibres, which shine like silk, and are as white as snow: of these, which are very strong, they make their finest cloths; and of the leaves, without any other preparation than splitting them into proper breadths, and tying the strips together, they make their fishing-nets, some of which are of an enormous size.

The seeds of this valuable plant have been brought over into England; but, upon trial, appeared to have lost their vegetating power.

The filamentous parts of different vegetables have been employed in different countries for the same mechanic uses as hemp and flax among us. Putrefaction,

and in some degree alkaline lixivium, destroy the pulpy or fleshy matter, and leave the tough filaments entire. By curiously putrefying the leaf of a plant in water, we obtain the fine flexible fibres which constituted the basis of the ribs and minute veins, and which form as it were a skeleton of the leaf. In Madagascar, different kinds of cloth are prepared from the filaments of the bark of certain trees boiled in strong ley; and some of these cloths are very fine, and approach to the softness of silk, but in durability come short of cotton: others are coarser and stronger, and last thrice as long as cotton; and of these filaments they make sails and cordage to their vessels. The stalks of nettles are sometimes used for like purposes, even in France; and Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by several, that muslin and callico, and most of the Indian linens, are made of nettles. A strong kind of cloth is said to be prepared in some of the provinces of Sweden of hop-stalks; and in the Transactions of the Swedish Academy for 1750, we have an account of an experiment relating to this subject: A quantity of the stalks was gathered in autumn, which was equal in bulk to a quantity of flax sufficient to yield a pound after preparation. The stalks were put into water, and kept covered with it during the winter. In March they were taken out, dried in a stove, and dressed as flax. The prepared filaments weighed nearly a pound, and proved fine, soft, and white; they were spun and wove into six ells of fine strong cloth. Unless the stalks are fully rotted, which will take much longer time than flax, the woody part will not separate, and the cloth will prove neither white nor fine.

PHOSPHAT, is a mineral found in Estremadura, It is of a whitish colour, and of great solidity, though not sufficiently hard to strike fire with steel. If triturated in an iron mortar in the dark, or even if two pieces of it be rubbed together, it becomes luminous; but when it has once lost this property, it does not, like some natural phosphori, receive it again by being exposed to the rays of the sun. If reduced to a very fine powder, and laid on coals, it does not decrepitate, but burns with a beautiful green light; though, if the coals be very hot, and the powder coarse, decrepitation will take place.

According to the analysis made by these chemists, 100 grains of the calcareous phosphat is resolvable into the following elements:

Carbonic acid	1 grain
Muriatic acid	$\frac{1}{2}$
Iron	1
Quartzous earth	2
Pure calcareous earth	59
Phosphoric acid	34
Fluoric acid	$2\frac{1}{2}$

100 grains.

We have the following account of an analysis of a native phosphat of lime (earth of bones) by Mr Hassenfratz in the *Annals of Chemistry*. "The phosphat of lime of Estremadura, found by Mr Proust, determined me to examine on the coals a phosphorescent powder which I collected at Kobala-Polyana near

Phosphat, Sigeth, in the county of Marmarosch, during the metallurgic tour I made through Hungary by command of government. Though this powder gives absolutely the same appearance when treated on the coals as the fluat of lime (*spath-fluor*), yet no fluoric acid is disengaged from it when heated with sulphuric acid. It dissolves in nitric acid (dephlogisticated nitrous acid); and sulphuric (vitriolic) acid precipitates from this solution a considerable quantity of sulfat of lime (gypsum): the liquor filtered, and concentrated by evaporation, gives a new precipitate similar to the former. The liquor again filtered, and evaporated to dryness, left a slight residuum. This residuum, after having been exposed to a fire sufficiently strong to make the vessel containing it red-hot, and disengage the nitric and sulphuric acids which might have remained united with it, was soluble in distilled water, which it acidified. This acid did not precipitate barytic muriat; it caused a white precipitate from the solutions of sulfat of iron (green vitriol), and nitrat of mercury (mercurial nitre), and formed a thick and copious one in lime water: hence it is evident, that this acid was the phosphoric, and the powder was phosphat of lime."

The phosphat of soda is obtained by combining the phosphoric acid with the mineral alkali. It has, we are told, been given with success as a purge; and M. Pelletier thinks it may be applied to the soldering of metals instead of borax: and indeed it resembles this substance so much in many of its properties, that it has been supposed that phosphoric acid is one of the constituent principles of borax. See CHEMISTRY, n° 904.

¹ **PHOSPHORUS**, a name given to certain substances which shine in the dark without emitting heat. By this circumstance they are distinguished from the *pyrophori*, which though they take fire on being exposed to the air, are yet entirely destitute of light before this exposure.

² Phosphori are divided into several kinds, known by the names of *Bolognian phosphorus*, *Mr Canton's phosphorus*, *Baldwin's phosphorus*, *phosphorus of urine*, &c. of which the last is by far the most remarkable both with respect to the quantity of light which it emits, and its property of taking fire and burning very fiercely upon being slightly heated or rubbed. For the method of preparing these, see CHEMISTRY-Index.

³ Besides these, however, it has been found that almost all terrestrial bodies, upon being exposed to the light, will appear luminous for a little time in the dark, metals only excepted. This points out a general division of the phosphori into two classes; namely, such as require to be exposed to the light either of the sun or of some artificial fire, before they become luminous; and such as do not. Of the former kind are the *Bolognian phosphorus*, *Mr Canton's phosphorus*, the phosphori from earths, &c. Of the latter kind are rotten wood, the skins of fishes, and the phosphorus of urine. To these we may add some other substances which become luminous in another way; viz. the mass which remains after the distillation of volatile sal ammoniac with chalk, loaf-sugar, and the phosphorus of urine dissolved in spirit of wine. The first, which is a composition of the marine acid of the sal ammoniac with the chalk, after being fused in a crucible, becomes luminous when

struck with any hard body; white sugar is luminous when grated or scraped in the dark; and the solution of phosphorus in spirit of wine is luminous only when dropped into water; and even then the light is only perceived where the drops fall into the liquid. One part of phosphorus communicates this property to 600,000 parts of spirit of wine.

There is a remarkable difference between the light of rotten wood, fishes, and that of phosphorus of urine, even when it is not in an ignited state; for this last does not cease to be luminous even when included within an exhausted receiver; the contrary of which happens to rotten wood and fishes. If air is strongly blown upon this phosphorus from a pair of bellows, it will extinguish its light for some time, which is not the case with the other kinds. When kept in water, and placed in a warm air, the phosphorus of urine discharges such large and bright flashes into the air above it, as are apt to surprise and even frighten those who are unacquainted with it. These coruscations are contracted in their passage through the water, but expand as soon as they get above it; however, the experiment can only be tried to advantage in warm weather, and in a cylindrical glass not above three quarters filled with water.

⁴ The phenomena exhibited by the earthy phosphori are very curious; both on account of the singular circumstances in which they exhibit their light, and the varieties observed in the light itself. All these, as has been already mentioned, emit no light till they have been first exposed to the light of the sun, or some other luminous body. After that, they are luminous in the dark for a considerable time; but by degrees their light dies away, and they emit no more till after another exposure to the sun. But if this happens to be too long continued, they are then irrecoverably spoiled. The same thing will happen from being too much heated without any exposure to light. Indeed, if a phosphorus, which has just ceased to be luminous, be heated, it will again emit light without any exposure to the sun; but by this its phosphoric quality is weakened, and will at last be destroyed. Indeed these phosphori are so tender, and impatient either of light or heat, that the best method of rendering them luminous occasionally is by discharging an electric bottle near them. The light of the flash immediately kindles the phosphorus, and it continues luminous for a considerable time, after which it may again be revived by another flash, and so on. However, with all the care that can be taken, these phosphori are very far from being perpetual; nor has any method been yet fallen upon to render them so.

⁵ The singularities in the light of the phosphori above-mentioned are, that they emit light of many different and most beautiful colours. This difference of colours seems to be natural to them; for some will at first emit a green, others a red, others a violet, &c. at their formation. However, the best kinds agree in this strange property, that if they are exposed to a red light, they emit a red light in the dark; and the same of other colours. But this must not be understood without limitation; nor is the phosphoreal light at any time so bright as the luminous body, whatever it was, by which it was kindled. Neither are we to imagine, that any particular phosphorus has a particular

Phosphorus is a kind of light appropriated to it; for the same phosphorus which at one time emits a purple light, will at another perhaps emit a green, or a light of some other colour.

6
The nature
of phospho-
ric pheno-
mena ex-
plained.

† See the
article
GOLD.

The explanation of the principal phenomena of phosphorus is deducible from what has been shown concerning the nature of fire, compared with what is mentioned under the article QUICKLIME. Under this last article it is shown, that, when calcareous earths are deprived of their fixed air, a proportionable quantity of active fire is absorbed by them; that is, the etherial fluid which pervades all bodies, has a violent tendency to expand itself, or to act all around every particle of the calcined earth, as from a centre. Of consequence, if this tendency was not counteracted by some other power, these substances would emit a perpetual flame. This power, however, is found in our atmosphere; which has already been shown either to be the positive principle of cold, or to contain it†. Hence, the latent fire in these substances is checked, and cannot act, excepting within the very substance itself. But if any other body comes in contact with the calcined earth, in which the principle of cold is less vigorous than in the atmosphere, the active fire in the quicklime immediately shows itself, and the body either becomes hot, or is consumed as if by fire. Hence it will follow, that if a very inflammable body is touched by quicklime, it ought to be set on fire. But of this we have no instance, because it is impossible for the quicklime to part with any of its fire, unless it receives something in exchange. This indeed it might receive from the atmosphere; which could supply it either with more fire, if it was in a state of ignition; or with fixed air, if any substance was at hand to receive the fire. But the atmosphere refuses to part with the fire which it contains, because the effort of the fire in the quicklime is not sufficiently strong to overcome the opposition it meets with in other bodies; and, on the other hand, the effort of the fire in the quicklime is sufficient to keep the earth from attracting fixed air out of the atmosphere. But when water, for instance, is poured on the quicklime, the dry earth absorbs it very greedily, and parts with a proportionable quantity of its latent fire, which the water also absorbs much more readily than the atmosphere. Hence the mixture becomes so exceedingly hot as sometimes to fire combustible bodies. Now if, instead of water, we suppose the lime to be mixed with oil, this also will absorb the fire, but not with such force as the water; neither is the heat by any means so considerable; because oil is capable of detaining a vast quantity of heat in a latent state, the only consequence of which is an increase of its fluidity, without any very perceptible change of temperature. At the same time, however, we must remember, that if the oil is in very small quantity, and intimately combined with the quicklime in that peculiar state which was formerly called *phlogiston*, it is easy to conceive, that it may be so much saturated with fire, as to be unable to contain any more without being ignited. In this case, if more fire is forced into the compound, a quantity of the phlogistic matter which it contains will be decomposed; and of consequence, the fire which it has imbibed will be thrown out, as in the common ignition of vapour; and in proportion to the degree of heat thus communicated, will the degree of ignition

and the continuance of it be. If the quantity of heat is very great, the phlogiston will be dissipated all at once; but if otherwise, the ignition will continue for a much greater length of time, as is the case with a common fire.

To apply this to the accension of phosphori, we must consider that these substances are all formed by calcining calcareous substances, and combining them with some portion of phlogistic matter. Baldwin's phosphorus is made by dissolving chalk in the nitrous acid, afterwards evaporating the solution, and driving off most of the acid. The consequence of this is, that the earth is left in an exceedingly caustic state, as the acid expels the fixed air more completely than could be done almost by any calcination whatever; at the same time that any phlogistic matter which might have been contained in the mixture is most accurately diffused through it, and combined with it. The Bolognian phosphorus is composed of a gypseous earth, which contains a quantity of vitriolic acid; and as no mineral is to be found perfectly free from phlogistic matter, the vitriolic acid unites with it during the calcination into an exceedingly inflammable sulphur; for the greater the quantity of acid there is in proportion to the phlogiston, the more inflammable is the compound*. Thus the Bolognian, as well as Baldwin's phosphorus, is a compound of quicklime and inflammable matter; and the case is still more plain with regard to Mr Canton's, where the quicklime is mixed with sulphur, and both calcined together.—Neither are the phosphori made by calcining oyster-shells without addition to be accounted any way different from those already mentioned; since the shells always contain some portion of inflammable matter, which, being reduced to a coal by the action of the fire, furnishes a quantity of phlogiston, and imparts it to the whole of the calcareous matter.

Having thus seen that the phosphori of which we now speak are all composed of pure calcareous earth and phlogiston, we are next to consider, that the phlogiston must be in such a state as it is when saturated with fire and ready to inflame. It is not indeed in the state of vapour, because this would require a quantity of fire detached from any other substance, and interposed between the particles of the vapour, in order to keep them at a distance, or to give it elasticity. But the fire which ought to do this is confined by the calcareous earth, which also detains the phlogiston itself. As long therefore as the balance is thus preserved, the phosphorus cannot shine; but as soon as a fresh quantity of light is discharged upon it, then more light or fire (for they are the very same in this case) enters the quicklime than it can contain. The consequence of this is, that the quantity which cannot be retained by the earth, exerts its force upon the phlogiston; which having already as much as it can hold, not only the superfluous quantity is discharged, but also part of that which the phlogiston had absorbed before. The burning indeed is very slow and weak, because the phlogiston is obstinately retained by the earth, which both impedes the ignition, and prevents the dissipation of the phlogiston in vapour. However, as soon as the lime has by its action impeded the farther extrication of the phlogiston, the balance is restored, the fire goes out, and the phosphorus ceases to be luminous. Heat

7
The com-
position of
different
phosphori.

* See the
article Sul-
phur.

8
State of the
phlogiston.

Phosphorus will kindle it again; but thus a larger quantity of phlogistic matter is dissipated, and the phosphorus is soon destroyed. Light does the same, but in a much more moderate degree; and therefore the phosphorus may be frequently rekindled by means of light, and will continue its splendor for a long time. But if the light is too long continued, or too violent, it will produce the same consequence whether it is attended with perceptible heat or not.

9
Particulars
reflecting
phosphorus
of urine.

With regard to the phosphorus of urine, the case is the same; only, instead of the calcareous earth, we have here an acid joined with phlogiston. The latter is in exceeding small quantity, and of consequence so loaded with fire that the least additional heat, rubbing, or alteration in the weather, forces more fire upon it than it can bear, and therefore part of it is continually flashing off in those coruscations formerly mentioned. The reason why this phosphorus flashes like lightning, and the others give only a steady light like coals, is, that the compound is very volatile. It requires indeed a violent fire to distil it at first; but in the distillation so much fire is imbibed, that it seems ever afterwards ready to evaporate spontaneously; and therefore phosphorus, when once made, is easily redistilled in close vessels.

10
Why it
shines un-
der water.

It now remains only to show the reason why the phosphorus of urine and some others will shine under water, or in an exhausted receiver, while rotten wood, &c. will not. This seems to arise from the quantity of fire which they have *internally*, and which requires no supply from the external air, as in the case of common fire: and hence the phosphorus of urine shines more briskly *in vacuo* than in the air; because the pressure of the atmosphere is then taken off, and the evaporation of the phlogistic matter promoted. The light of fishes and rotten wood seems to be of an electric nature; and therefore ceases when the air is exhausted, as on this fluid all the phenomena of electricity are found to depend.

11
Cause of
the various
colours of
phosphoric
light.

With regard to the various colours of phosphoric light, some have imagined that the earthy substance was capable of imbibing a certain quantity of light, and emitting it afterwards in the very same state, and having the same colour which it had before. But this is now known to be a mistake, and the light of the phosphori is found to be owing to a true accension, though weak, as in other burning bodies. Hence it is very probable that the colour of the light depends upon the degree of accension; for we see that even in common fires the colour depends in a great measure on the strength of the flame. Thus the flame of a candle, where it is not well kindled at bottom, always appears blue. The flame of a small quantity of sulphur, or of spirit of wine, is blue; but if a large quantity of either of these substances be set on fire, the flame will in many places appear white. A strong flame mixed with much smoke appears red; a weak one in similar circumstances appears brown, &c.—Hence if the phosphoric is weakly kindled it will emit a brown, violet, blue, or green flame; if strongly, a red or white one.

It has already been mentioned, that almost all terrestrial bodies have a phosphoric quality: however this, in most of them, is extremely weak, and continues

only for a very short time. Signor Beccaria, who discovered this property, in order to find out what substances were phosphoric and what were not, had a machine contrived like a dark lanthorn, in which he included himself, in order to perceive with the greater facility any small quantity of light which might be emitted by the substances which he designed to examine. In the side of the machine was a cylinder capable of being turned about without admitting any light. Upon this were pasted the substances he designed to examine, and by turning the cylinder he immediately brought them from the light of the sun into intense darkness; in which situation there were but few substances which did not afford a sufficient quantity of light to render themselves visible. This phenomenon, however, is evidently similar to an optical illusion by which we are made to see what is not present before us; for if we look very intensely upon any thing for some time, suffering no more light to enter our eyes than what is reflected from that object, we will imagine that we still see it, though we remove into the dark or shut our eyes. The reason of this is, that the nervous fluid being once put in motion after a certain manner, continues that motion for a short space of time after the moving cause is removed. In like manner, as the light is partly reflected from bodies, and partly penetrates them, when any body is exposed to the light, and then is suddenly brought into a dark place, the ethereal fluid within its substance being once put into motion does not cease to move immediately, but for a time produces that vibration which we call *light*: for the substance of light is present in the most intense darkness as well as in sunshine. Hence almost all substances are capable of emitting light in the dark, after being exposed to a vigorous sunshine; though the reason of their doing so may be very different from that by which the phosphori become luminous.

Many entertaining experiments may be made with the various kinds of phosphori, especially with that of urine. This last, however, is sometimes dangerous on account of the violence with which it burns. If dissolved in oil of cloves, it loses this property, but continues to be as luminous as before; so that this mixture, called *liquid phosphorus*, may be used with safety. As on some occasions it may be wished to have it in powder, it is proper to observe that this may be done with safety by pouring some hot water upon the phosphorus in a glass mortar. The compound melts, and while in a soft state is easily reducible to powder of any degree of fineness.

Mr Margraff endeavoured to combine phosphorus with metals by distillation; but zinc and copper were the only two metals that showed any signs of combination (See CHEMISTRY, n° 1413.) The great analogy, however, that has been observed between the properties of phosphorus and those of sulphur and arsenic, induced M. Pelletier long ago to suspect, that phosphorus would really combine with metals, and that the essential point was to retain the phosphorus in contact with the metal in a state of fusion. This happy idea led him to a method from which he has obtained all the success that could be desired. Of this we have already given a very contracted account after the word *Phosphorus*.

Phosphorus in the *Index* to our article CHEMISTRY; we shall now extend that account, by giving that in the first volume of *Annals of Chemistry*.

Each of the combinations which are now to be described, M. Pelletier has termed *phosphorated metal*.

¹⁵ *Phosphoret of gold.* "M. Pelletier mixed half an ounce of gold of parting, in powder, with an ounce of phosphoric glass and about a dram of powdered charcoal; he put this mixture into a crucible, covering it with a small quantity of charcoal powder; and then applied a degree of heat sufficient to melt the gold. During the operation, a considerable quantity of vapours of phosphorus was disengaged, but all the phosphorus which was produced was not dissipated; a small quantity united with the gold, which was whiter than in its natural state, broke under the hammer, and had also a crystallized appearance.

"Twenty-four grains of this phosphoret of gold, placed on a cupel in a heated muffle, lost only one grain, and the button of gold that remained had the peculiar colour of that metal.

¹⁶ *Of Platina.* "A mixture, consisting of an ounce of platina, an ounce of phosphoric glass, and a dram of powdered charcoal, being put into a crucible, and covered with a little charcoal powder, M. Pelletier gave it a degree of heat nearly equal to what would have fused gold: this he continued for an hour. Having broken the crucible, he found underneath a blackish glass a small button of a silver white, weighing more than an ounce. On the inferior part of the button were well defined crystals of the same substance, the figure of which was a perfect cube. The same experiment, frequently repeated, constantly afforded the same result.

"The phosphoret of platina is very brittle, pretty hard, and strikes fire with steel: it is not acted upon by the magnet, and when it is exposed naked to a fire capable of fusing it, the phosphorus is disengaged, and burns on its surface. Exposed to the fire in a cupelling furnace on porcelain tests, the phosphoret of platina leaves a black glass, which surrounds the metallic substance. The colour of the glass is owing to iron contained in the platina; and if it continue exposed to the same heat in fresh tests, the portions of glass that form latterly have not so deep a colour, are more or less greenish, have sometimes a bluish tinge, and become at last of a transparent white. This observation led M. Pelletier to imagine, that phosphorus was well adapted for separating iron from platina, and that it was one of the best means of separating it entirely from that metal. But the glass which results from the combustion of the phosphorus and its combination with the oxyd (calx) of iron, forms a crust which obstructs the combustion of the phosphorus that still remains combined with the platina. To overcome this obstacle, M. Pelletier thought of exposing the phosphoret of platina to the fire, in cupels made of calcined bones, which, as they easily absorb the glass of lead, ought also to have the property of absorbing the phosphoric glass. He repeated the operation, therefore, several times successively, changing the cupel. A button of platina, which had been thus operated on four times, he presented to the academy: in this state it was capable of being reduced into plates, but was brittle when heated.

"Since the reading of his memoir, M. Pelletier has *Phosphorus* pursued his process, and has advanced so far as to be able totally to free the platina from the phosphorus, so that it may be worked when heated: thus he has procured us a method of purifying this metal more advantageous probably than any hitherto attempted. The phosphoret of platina, detonates strongly when it is thrown on nitre in fusion. A mixture of phosphoret of platina, and oxygenated muriat of potash (*dephlogisticated digestive salt*), thrown into a red hot crucible, produces a brisk detonation, and the platina remains pure in the crucible.

"Half an ounce of silver, treated with an ounce of ¹⁷ *Of silver.* phosphoric glass and two drams of charcoal, acquired an increase of weight of one dram. The phosphoret formed was white: it appeared granulated, and as it were crystallized: it broke under the hammer, but was capable of being cut with a knife. Placed in a cupel in a heated muffle, the phosphorus was disengaged, and the silver remained quite pure.

"In preparing phosphorus in the large way, M. Pel- ¹⁸ *Of copper.* letier observed, that the phosphoric acid attacked in some degree the copper basons, which are in other respects very convenient for this operation; and in the retorts which he made use of for the distillation, he found phosphoret of copper, sometimes in small distinct grains, at others in large masses, according as the degree of heat which finished the operation was more or less intense. This phosphoret he exhibited to the academy, and thence it was mentioned in the chemical nomenclature. The phosphoret of copper is also obtainable by a process similar to that which we have described for obtaining that of gold, silver, and platina. The proportions which M. Pelletier employed were an ounce of shreds of copper, an ounce of phosphoric glass, and a dram of powdered charcoal. This phosphoret appears whitish, is sometimes variegated with the different colours of the rainbow; changes on exposure to the air like pyrites, loses its lustre, and assumes a blackish hue.

"Margraff had formed phosphoret of copper by distilling the oxyd of copper, called *crocus veneris*, with phosphorus; and M. Pelletier also obtained it by the same process: but he did not observe the property attributed to it by Margraff, of running when applied to a candle. Having placed the phosphoret in a cupel in a heated muffle, it was fused, the phosphorus inflamed on its surface; a blackish substance resembling scorix remained in the cupel, which was penetrated with a glass that gave it a blue colour.

"The phosphoret of iron produced by the fusion of an ounce of phosphoric glass, and an ounce of shreds of iron, mixed with half a dram of powdered charcoal, was very brittle, and broke white, with a striated and granulated appearance: in one cavity it was crystallized in rhomboidal prisms. It is the same substance which Bergman conceived to be a peculiar metal.

"This phosphoret, placed in a cupel in a heated muffle, soon entered into a state of fusion; in the cupel remained a brittle substance, which is an oxyd of iron, and the cupel was penetrated with a matter similar to that which M. Pelletier had observed on treating in the same manner phosphoret of platina, obtained from platina not purified.

"The

¹⁹
Of lead. Phosphorus "The phosphoret of lead, obtained by the process already described, appears little different from common lead. It is malleable, and easily cut with a knife, but it loses its lustre sooner than lead, and when melted on charcoal by the blow-pipe, the phosphorus burns, leaving the lead behind.

²⁰
Of tin. "The phosphoret of tin, which M. Pelletier obtained by his process, was divided into several grains, because he had not given a sufficient degree of fire to unite them. These grains did not appear different from the metal itself; but being melted with the blow-pipe, the phosphorus burnt on the surface of the metal, as in the similar experiment with lead.

"In fusing tin or lead with the charcoal powder and phosphoric glass, care must be taken not to urge the fire, as the phosphorus easily flies off from either of those metals.

"From the experiments of M. Pelletier, it appears that phosphorus may be combined with gold, platinum, silver, copper, iron, tin, and lead; and that it deprives the five former metals of their ductility. M. Pelletier proposes to make further experiments, to ascertain whether it be possible or not to combine a greater quantity of phosphorus with the two latter, and whether they will retain their malleability in that case. In another memoir he will examine the action of phosphorus on semimetals: he proposes also to ascertain the order of its affinity with the metals and semimetals.

"It is much to be wished that M. Pelletier may carry to perfection a work which will enrich chemistry with a species of combination hitherto almost entirely unknown, and which he has discovered means of effecting by a process equally simple and ingenious."

In the 10th volume of the same Annals we find an account of the action of lime, and of some metallic oxyds on phosphorus, by Dr Raymond.

²¹
M. Gengembre's discovery of a peculiar kind of gas. M. Gengembre discovered, that by boiling phosphorus in a solution of potash, a peculiar kind of gas was produced, which had the singular property of taking fire on coming into contact with the atmosphere, and to which the French chemists have given the appellation of *phosphorized hydrogen gas*. Dr Raymond thought of varying the process, in order to discover whether this gas might not be produced in some other way. He took two ounces of lime slaked in the air, a dram of phosphorus cut small, with half an ounce of water, which he mixed up into a soft paste, and put into a stone retort; to this retort a tube was fitted, the internal diameter of which, he says, ought not to exceed a line and a half, communicating with a receiver full of water. As soon as the retort was well heated, the phosphorized hydrogen gas was generated so abundantly, that, from the quantity of ingredients here mentioned, no less than three quarts of it were obtained. The residuum was found to have all the characters of the native phosphat of lime. Hence the Doctor supposes, that the water was decomposed during the process, and that its oxygen served to acidify the phosphorus; which, in this state, was combined with the lime, and formed the phosphat; while its hydrogen, assuming a gaseous state, carried with it a part of the phosphorus, to which the property of taking fire by contact with the air must be ascribed. The gas soon loses this property, and the phosphorus is

condensed on the sides of the receiver: great caution, however, is necessary; for though a part of the gas may seem to have deposited its phosphorus, and to be reduced to pure hydrogen, yet another part, in the same receiver, may retain enough to cause a formidable explosion, when in contact with air.

The facility with which water was thus decomposed led the author to suspect that a similar effect might be produced by the same mixture in the mean temperature of the atmosphere. Accordingly he found that in ten days time a small quantity of hydrogen gas was generated in the vials, in which the ingredients were placed: this, however, was not phosphorized, the heat not being sufficient to volatilize the phosphorus.

²³
Another variation. Animated by this success, Dr Raymond resolved to try what could be effected by metallic oxyds. He made two mixtures like the former: but instead of lime, he substituted in the one the white oxyd of zinc, and in the other the black oxyd of iron. After long distillation with great heat, he obtained from both phosphorized hydrogen gas: but it was produced in much less time, and in greater quantity, from the oxyd of zinc than from that of iron; which he ascribed to the close affinity of the former to the phosphoric acid.

²⁴
Process for making Kunkel's phosphorus from urine. In the 12th volume of the same valuable work, we have an account of a process for making Kunkel's phosphorus from urine, which is shorter and more economical than that by which Messrs Scheele and Ghan extract it from the bones of animals, by M. Giobert. This method is founded on the property of the metallic salts to separate the phosphoric acid from urine, which Margraff, we believe, first discovered: but M. Giobert has greatly improved on the process directed by the German chemist, as he avoids the tedious and disgusting operations of evaporating the urine, and exposing it to putrefaction. He tells us, that it is indifferent whether the urine be that of healthy or diseased persons; and that of horses is nearly as good for this purpose as that which is human. He gradually pours into it a solution of lead in the nitric acid, till the precipitation ceases which this had occasioned; the whole is then diluted with a considerable quantity of water, and afterward filtrated through a linen cloth. The precipitate, which is phosphat of lead, must be made up into a paste with powder of charcoal, and well dried in an iron or copper pan: it must afterward be distilled; when it will yield, first, an ammoniacal, and then an empyreumatic oil; these oils proceed from the urine, from which it is difficult to purify the phosphat. As soon as the oil ceases to come over, a clean receiver must be applied, and the fire be greatly increased. The phosphorus generally appears in about half an hour; and, within eight hours, twelve or fourteen ounces of it may thus be obtained. If the process be conducted with care, M. Giobert thinks that a hundred parts of phosphat of lead will yield between fourteen and eighteen of phosphorus.

If on the phosphat of lead thus precipitated from urine, a solution of sulphat of ammoniac be poured, and this, after digesting during twelve hours, be filtrated and evaporated, phosphat of ammoniac will be obtained; and if sulphat of soda be used, the result will be phosphat of soda.

Acid of PHOSPHORUS. This acid, called also the *microcosmic*

Phosphorus *microsmic* acid, has already been described. See CHEMISTRY-Index at *Phosphoric Acid* (A). It has been discovered by Mr Scheele, that an acid capable of making phosphorus is producible from calcined bones or hartshorn and the vitriolic acid. The process for procuring this acid recommended by that gentleman was to dissolve the bones in nitrous acid; afterwards to precipitate the earth by means of the vitriolic acid; to filter and evaporate the liquor to dryness; and, after driving off the nitrous acid, the phosphoric acid remains. This process, however, is expensive on account of the waste of nitrous acid; and is likewise very inconvenient, because a great deal of the earthy matter continues dissolved even after the vitriolic acid is poured in; and therefore the phosphoric acid is never to be obtained pure: for which reason the following process is preferable.

Take of calcined bones or hartshorn, one pound; oil of vitriol, 14 ounces. Let the bones be reduced to fine powder; then pour on the acid undiluted, and rub both together till they are as accurately mixed as possible. Having let them remain for some hours in this situation, pour on as much water, stirring and dissolving the lumps, into which the mass will now be concreted, till it is all equally distributed through the liquid, and has the consistence of thick gruel. Let it remain 24 hours, and then pour it into a canvas cloth in order to let the liquid drain from it. This is a very tedious operation, as fresh water must continually be pouring on till all the saline matter is washed off. When this is done, pour into the liquid a quantity of caustic volatile alkali, which will occasion a copious precipitation; for the earth of bones is much less strongly attracted by acids than even the caustic volatile alkali. The liquid being now filtered a second time, which will be done with sufficient ease, and afterwards evaporated, there remains a mass composed of phosphoric acid and vitriolic sal ammoniac. By increasing the fire, the latter is dissipated in vapour; and if the process has been successful, four ounces or more of pure phosphoric acid will remain.

With regard to the properties of this acid, it is not yet ascertained whether they are exactly the same with the microsmic acid or not. Indeed, as far as yet appears, they seem to be different; and there are very strong reasons for supposing that the phosphoric acid thus produced is no other than the vitriolic altered by its combination with the earth of bones. See the article BONES.

Liquor of PHOSPHORUS. See CHEMISTRY, n° 2d 957. 3521.

PHOTINIANS, in ecclesiastical history, were a sect of heretics in the fourth century who denied the divinity of our Lord. They derive their name from *Photinus* their founder, who was bishop of Sirmium, and a disciple of Marcellus. Photinus published in the year 343 his notions respecting the Deity, which were repugnant both to the orthodox and Arian systems. He asserted, that Jesus Christ was born of the Holy Ghost and the Virgin Mary; that a certain divine emanation, which he called the *Word*, descended upon Him; and that because of the union of the divine word with his human nature, He was called the son of God, and even God himself; and that the Holy Ghost was not a person, but merely a celestial virtue proceeding from the Deity. Both parties condemned the bishop in the councils of Antioch and Milan, held in the years 345 and 347. He was condemned also by the council at Sirmium in 351, and was afterwards degraded from the episcopal dignity, and at last died in exile in the year 372 or 375. His opinions were afterwards revived by Socinus.

PHOTIUS, patriarch of Constantinople, was one of the finest geniuses of his time, and his merit raised him to the patriarchate; for Bardas having driven Ignatius from the see, Photius was consecrated by Asbestus in 859. He condemned Ignatius in a synod, whereupon the pope excommunicated him, and he, to balance the account, anathematized the pope. Basilus of Macedon, the emperor whom Photius had reproved for the murder of Michael the late emperor, expelled him, and restored Ignatius; but afterwards re-established Photius, upon Ignatius's death, in 878. At last, being wrongfully accused of a conspiracy against the person of Leo the philosopher, son and successor to Basilus, he was expelled by him in 886, and is supposed to have died soon after. He wrote a *Bibliotheca*, which contains an examen of 280 authors: we have also 253 epistles of his; the *Nomocanon* under 14 titles; an abridgment of the acts of several councils, &c. This great man was born in Constantinople, and was descended from a very illustrious and noble family. His natural abilities were very great, and he cultivated them with the greatest assiduity. There was no branch of literature, whether sacred or profane, and scarcely any art or science, in which he was not deeply versed. Indeed he appears to have been by far the greatest man of the age in which he lived; and was so intimately concerned in the chief transactions of it, that ecclesiastical writers have on that account called it *Seculum Photianum*. He was first raised to the chief dignities of the empire, being made principal secretary of state, captain

(A) See particularly n° 904. In addition to what has been already said on the acid of phosphorus, we may just observe, that M. Pelletier has a memoir on this subject in the 14th volume of the Chemical Annals. This philosopher's method of preparing the phosphorous acid differs little from that which was some years ago proposed by M. Sage, and which, we believe, is now pretty generally known. The principal alterations made by the author of the present memoir consist in his putting each stick of phosphorus into a glass pipe, the lower part of which is shaped like a funnel, terminating in a very small opening; and in covering the apparatus with a tubulated receiver, which he can open at pleasure. By these means he can dissolve a greater quantity of phosphorus without danger of an explosion. His method of converting the phosphorus into the phosphoric acid, by the nitric or the oxygenated muriatic acid, is the same with that discovered by M. Lavoisier, which is described in his Elements of Chemistry.

Phraates
||
Phreatis.

captain of the guards, and a senator. In all these stations he acquitted himself with a distinction suitable to his great abilities; for he was a refined statesman, as well as a profound scholar. His rise to the patriarchate was very quick; for when he was chosen to that office he was only a layman: but that he might be as it were gradually raised to that dignity, he was made monk the first day, reader the next, and the following days sub-deacon, deacon, and priest. So that in the space of six days he attained to the highest office in the church. On the whole, however, his ardent love of glory and unbounded ambition made him commit excesses which rendered him a scourge to those about him.

Fabricius calls this *Bibliotheca* or library, *non liber, sed insignis thesaurus*, "not a book, but an illustrious treasure," in which are contained many curious things relating to authors, and many fragments of works which are no where else to be found. It was brought to light by Andreas Schottus, and communicated by him to David Hoefcheli, who caused it to be printed in 1601. Schottus, considering the great utility of this work, translated it into Latin, and printed his translation alone in 1606. The Greek text, together with the translation, were afterwards printed at Geneva in 1611. The last edition of this work, the largest, and the fairest, was printed at Rouen in 1653, folio.

PHRAATES, or PHRAHATES. There were four kings of this name in Parthia. See PARTHIA.

PHRASE, in grammar, an elegant turn or manner of speech, peculiarly belonging to this or that occasion, this or that art, or this or that language. Thus we say, an Italian *phrase*, an eastern *phrase*, a poetical *phrase*, a rhetorical *phrase*.

PHRASE is sometimes also used for a short sentence or small set or circuit of words constructed together. In this sense, Father Buffier divides phrases into complete and incomplete.

Phrases are *complete* where there is a noun and a verb, each in its proper function; *i. e.* where the noun expresses a subject, and the verb the thing affirmed of it.

Incomplete phrases are those where the noun and the verb together only do the office of a noun; consisting of several words without affirming any thing, and which might be expressed in a single word. Thus, *that which is true*, is an incomplete phrase, which might be expressed in one word, *truth*; as, *that which is true satisfies the mind*, *i. e.* *truth satisfies the mind*.

PHRASEOLOGY, a collection of the phrases or elegant expressions in any language. See PHRASE.

PHREATIS, or PHREATIUM, in Grecian antiquity, was a court belonging to the civil government of Athens, situated upon the sea-shore, in the Piræus. The name is derived from *πρὸ τοῦ φρεατός*, because it stood in a *pit*; or, as others suppose, from the hero *Phreatus*. This court heard such causes as concerned persons who had fled out of their own country for murder, or those that fled for involuntary murder, and who had afterwards committed a deliberate and wilful murder. The first who was tried in this place was Teucer, on a groundless suspicion that he had been accessory to the death of Ajax. The accused was not allowed to come to land, or so much as to cast anchor, but plead-

ed his cause in his bark; and if found guilty, was committed to the mercy of the winds and waves, or, as some say, suffered there condign punishment; if innocent, he was only cleared of the second fact, and, according to custom, underwent a twelvemonth's banishment for the former. See Potter's *Gr. Antiq.* vol. i. p. 111.

PHRENETIC, a term used to denote those who, without being absolutely mad, are subject to such strong sallies of imagination as in some measure pervert their judgment, and cause them to act in a way different from the more rational part of mankind.

PHRENITIS, the same with PHRENSY; an inflammation of the meninges of the brain, attended with an acute fever and delirium. See MEDICINE, n° 176; also an account of a strange degree of phrenzy which attacked Charles VI. of France in the article FRANCE, n° 88, 90.

PHRYGANEA is a genus of insects, of which Barbut gives the following characters. "The mouth is without teeth, but furnished with four palpi: the stemmata are three in number: the antennæ are filiform, and longer than the thorax. The wings are incumbent; the under ones are folded."

The same author informs us, that the genus is divided into two sections: the first of which is characterized, by having two truncated setæ at the extremity of the abdomen, resembling the beard of an ear of corn; while the second has the abdomen simple, or without appendices. The tarsi of the feet of the first family consist of three articulations; those of the second are composed of five. The wings of this section decline from the inner margin towards the sides, so as to resemble the ridge of a house, and are curved, or turn upwards at their extremity. "This insect (says Mr. Barbut), before it becomes an inhabitant of the air, has lived under-water, lodged in a kind of tube or sheath, the inward texture of which is silk; outwardly covered with sand, straws, bits of wood, shells, &c. When the hexapod worm is about to change to a chrysalis, he stops up the opening of his tube with threads of a loose texture, through which the water makes its way, but prevents the approach of voracious insects. The chrysalis is covered with a thin gauze, through which the new form of the insect is easily discerned. The phryganea, on the point of changing its element, rises to the surface of the water, leaves its tube, rises into the air, and enjoys the sweets of the country, flutters upon flowers and trees, but is soon called away to the water-side to deposit its eggs; whence proceeds its posterity. These aquatic larvæ are often found in stagnating waters, where they wrap themselves up in the water-lentil, cut out into regular squares, and fitted one to another. Trouts are very greedy of these larvæ; which is the reason, that in some countries, after stripping them of their coats, they make use of them for fishing-baits."

There are a variety of different species of the phryganea; but except the phryganea bicauda and striata, they do not materially differ from one another, except in size and colour. The bicauda is of a deep dark-brown colour; having a single yellow longitudinal band running across the head and thorax. The legs are of a brown colour, as are the antennæ; which are also long and filiform. Two brown threads, almost as long

Phrenetic
||
Phryganea.

Phrygia. long as the antennæ, terminate the abdomen. The wings, which are about a third longer than the body, are veined with brown fibres, are narrow at the top, broad below, and are as it were stuck upon the body; which they infold, crossing one over the other. This insect, which is met with on the banks of rivers and standing-waters, carries its eggs in a cluster at its abdomen, like some spiders.

The *striata* is a large species, of a dun colour, except the eyes, which are black, and has a considerable resemblance to the *phalena* in the carriage of its wings. The antennæ are as long as the body, and are borne straight forward. The wings are a third larger than the body, having veins of a colour rather deeper than the rest. The feet are large, long, and somewhat finny. Mr Yeats tells us, that the *perlæ* of Geoffroy, and *phryganæ* of Linnæus, do not differ generically. It appears, however, from Yeats's experiments, that the *phryganæ* remain longer in the *chrysalis* than the *perlæ*.

The lesser *phryganæ* very much resemble the *tineæ*; but, upon examining them with a glass, the former will be found to be covered with small hairs instead of the scales which adorn the wings of the latter.

Ancient Universal History, vol. 3. p. 441. &c.

PHRYGIA, a country in Asia. From whence it derived its name is not certain: some say it was from the river *Phryx* (now *Sarabat*), which divides *Phrygia* from *Caria*, and empties itself into the *Hermus*; others from *Phrygia*, the daughter of *Asopus* and *Europa*. The Greek writers tell us, that the country took its name from the inhabitants, and these from the town of *Brygium* in *Macedonia*, from whence they first passed into Asia, and gave the name of *Phrygia* or *Brygia* to the country where they settled. Bochart is of opinion that this tract was called *Phrygia* from the Greek verb *φρυγναι* "to burn or parch;" which, according to him, is a translation of its Hebrew name, derived from a verb of the same signification.

No less various are the opinions of authors as to the exact boundaries of this country; an uncertainty which gave rise to an observation made by *Strabo*, viz. that the *Phrygians* and *Myrians* had distinct boundaries; but that it was scarce possible to ascertain them. The same writer adds, that the *Trojans*, *Myrians*, and *Lydians*, are, by the poets, all blended under the common name of *Phrygians*, which *Claudian* extends to the *Pisidians*, *Bithynians*, and *Ionians*. *Phrygia Proper*, according to *Ptolemy*, whom we choose to follow, was bounded on the north by *Pontus* and *Bithynia*; on the west by *Myria*, *Troas*, the *Ægean Sea*, *Lydia*, *Mæonia*, and *Caria*; on the south by *Lycia*; on the east by *Pamphylia* and *Galatia*. It lies between the 37th and 41st degrees of north latitude, extending in longitude from 56 to 62 degrees. The inhabitants of this country, mentioned by *Ptolemy*, are the *Lycaones* and *Anthemisenii*, towards *Lycia*; and *Moccadelis* or *Moccadine*, the *Cydeses* or *Cydises* towards *Bithynia*; and between these the *Peltini* or *Speltini*, the *Moxiani*, *Phylacenses*, and *Hierapolitæ*. To these we may add the *Berecynetes* mentioned by *Strabo*.

Phrygia is commonly divided into the Greater and Lesser *Phrygia*, called also *Troas*. But this division

did not take place till *Troas* was subdued by the *Phrygians*; and hence it is more considered by some Roman writers as a part of *Phrygia*, than *Bithynia*, *Cappadocia*, or any other of the adjacent provinces. In after ages, the Greater *Phrygia* was divided into two districts or governments; one called *Phrygia Pacatiana*, from *Pacatianus*, who, under *Constantine*, bore the great office of the *præfectus prætorio* of the East; the other *Phrygia Salutaris*, from some miraculous cures supposed to have been performed there by the archangel *Michael*.

This country, and indeed all Asia Minor, as lying in the fifth and sixth northern climates, was in ancient times greatly celebrated for its fertility. It abounded in all sorts of grain; being, for the most part, a plain country covered with a deep rich soil, and plentifully watered by small rivers. It was in some parts productive of bitumen and other combustible substances. It was well stocked with cattle, having large plains and pasture grounds. The air was anciently deemed most pure and wholesome, though it is now in some parts thought extremely gross, great part of the country lying uncultivated.

In *Phrygia Major* were anciently several cities of great celebrity; such as *APANEA*, *LAODICEA*, *HIERAPOLIS*, *Gordium*, &c.—There were also some famous rivers; such as *Marfyas*, *Mæander*, &c. The *Mæander* is now called *Madre* or *Mindre*, and was much celebrated by the ancients for its windings and turnings; from whence all such windings and turnings have been denominated *mæanders*.

The *Phrygians* accounted themselves the most ancient people in the world. Their origin, however, is extremely dark and uncertain. *Josephus* and *St Jerome* say, they were descended from *Togarmah*, one of *Gomer's* sons; and that they were known to the Hebrews under the name of *Tigrammanes*. The Heathen authors derive them from the *Brygians*, a people of *Macedonia*. But this is but mere conjecture; and it is a conjecture totally unsupported, except by the similarity of names. Bochart thinks that the *Phrygians* were the offspring of *Gomer* the eldest son of *Japhet*; the word *Phrygia* being the Greek translation of his name. *Josephus* makes *Gomer* the father of the *Galatians*; but he, by the *Galatians*, must necessarily mean the *Phrygians* inhabiting that part of *Phrygia* which the *Galatians* had made themselves masters of: the descendants of *Gomer* being placed by *Ezekiel* northward of *Judæa*, near *Togarmah* (which Bochart takes to be *Cappadocia*), long before the Gauls passed over into Asia. We are willing to let *Gomer* enjoy the fine country which Bochart is pleased to give him, and allow him the honour of being the progenitor of the *Phrygians*, since we know no other person on whom it can be conferred with any degree of probability.

The ancient *Phrygians* are described as superstitious, voluptuous, and effeminate, without any prudence or forecast, and of such a servile temper, that nothing but stripes and ill usage could make them comply with their duty; which gave rise to several true and well known proverbs (A). They are said to have been the first inventors of divination by the singing, flying, and feeding

(A) "Phryges sero sapiunt, Phryx-verberatus melior, Phryx non minus quam Spyntharus, &c.:" which proverbs

Phrygia. feeding of birds. Their music, commonly called the *Phrygian mood*, is alleged by some as an argument of their effeminacy.

Their government was certainly monarchical; for all Phrygia was, during the reigns of some kings, subject to one prince. Ninnacus, Midas, Manis, Gordius, and his descendants, were undoubtedly sovereigns of all Phrygia. But some time before the Trojan war, we find this country divided into several petty kingdoms, and read of divers princes reigning at the same time. Apollodorus mentions a king of Phrygia contemporary with Ilus king of Troy. Cedrenus and others speak of one Teuthrans, king of a small country in Phrygia, whose territories were ravaged by Ajax, himself slain in single combat, his royal seat laid in ashes, and his daughter, by name Tecmessa, carried away captive by the conqueror. Homer makes mention of Phoreys and Ascanius, both princes and leaders of the Phrygian auxiliaries that came to the relief of Troy. Tantalus was king of Sipylus only, and its district; a prince no less famous for his great wealth, than infamous for his covetousness and other detestable vices. That Phrygia was subdued either by Ninus, as Diodorus Siculus informs us, or by the Amazons, as we read in Suidas, is not sufficiently warranted. Most authors that speak of Gordius tell us, that the Phrygians having sent to consult an oracle in order to know how they might put an end to the intestine broils which rent their country into many factions and parties, received for answer, that the most effectual means to deliver themselves and their country from the calamities they groaned under, was to commit the government to a king. This advice they followed accordingly, and placed Gordius on the throne.

As to their commerce, all we can say is, that Apamea was the chief emporium of all Asia Minor.—Thither resorted merchants and traders from all parts of Greece, Italy, and the neighbouring islands. Besides, we know from Syncellus, that the Phrygians were for some time masters of the sea; and none but trading nations ever prevailed on that element. The country produced many choice and useful commodities, which afforded considerable exports. They had a safe coast, convenient harbours, and whatever may incline us to think that they carried on a considerable trade. But as most of the Phrygian records are lost, we will not dwell on conjectures so difficult to be ascertained.

We have no set form of their laws; and as to their learning, since we are told that for some time they enjoyed the sovereignty of the sea, we may at least allow them a competent skill in geography, geometry, and astronomy; and add to these, from what we

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have said above, a more than ordinary knowledge of music.

Some have been of opinion that the Phrygian language bore a great resemblance to the Greek; but the contrary is manifest from the few Phrygian words which have been transmitted to us, and carefully collected by Bochart and Rudbechius. To these we may add the authority of Strabo, who, after attempting to derive the name of a Phrygian city from the Greek, concludes, that it is a difficult matter to discover any similitude between the barbarous words of the Phrygian language and the Greek. The Phrygian tongue, after the experiment made by Psammethichus king of Egypt, was looked upon by the Egyptians as the most ancient language of the world. But other nations, particularly the Scythians, refused to submit to their opinion, as founded on an argument of no real weight. "As the two children (say they) had never heard the voice of any human creature, the word *bec*, or *bekkos*, the first they uttered, was only an imitation of the goats that had suckled them, and happened to be a Phrygian word signifying *bread* (a).

We have already said, that the Phrygians were superstitious; their idols were consequently very numerous. The chief of these was Cybele, who went by a variety of names. (See CYBELE.) They also worshipped Bacchus under the name of *Sabazios*; and his priests they called *Saboi*.

The history of their kings is dark and uncertain, and the dates of their several reigns and actions cannot now be fixed; we shall refer such of our readers, therefore, as wish to know what is certain respecting them, to the Ancient Universal History, already quoted more than once in the present article. See also GORDIUS, MIDAS, &c. For Phrygia Minor, see TROY.

PHRYGIAN STONE, in natural history, is the name of a stone described by the ancients, and used by them in dying; perhaps from some vitriolic or aluminous salt contained in it, which served to enliven or fix the colours used by the dyers. It was light and spongy, resembling a pumice; and the whitest and lightest were reckoned the best. Pliny gives an account of the method of preparing it for the purpose of dying, which was by moistening it with urine, and then heating it red hot, and suffering it to cool.—This calcination was repeated three times, and the stone was then fit for use. Dioscorides recommends it in medicine after burning; he says it was drying and astringent.

PHRYGIANS, a Christian sect. See CATAPHRYGIANS and MONTANIST.

PHRYNE, was a famous prostitute, who flourished at Athens about 328 years before the Christian era. She was mistress of Praxiteles, who drew her picture,

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which

proverbs intimate their servile temper; and show that they were more fit to bewail misfortunes in an unmanly manner, than to prevent them by proper measures. Their music, too, was suited to their effeminate temper. The Doric mood was a kind of grave and solid music; the Lydian a doleful and lamentable harmony; but the Phrygian chiefly calculated to effeminate and enervate the mind. But this character is contradicted by others.

(a) Goropius Becanus makes use of the same argument, to prove that the High-Dutch is the original or mother-tongue of the world, because the word *beker* in that language signifies "a baker."

Phrygia
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Phryne.

Phrynicus
||
Phryxus.

which was one of his best pieces, and was placed in the temple of Apollo at Delphi. We are told that Apelles painted his Venus Anadyomene after he had seen Phryne on the sea-shore naked, and with dishevelled hair. Phryne became so very rich by the liberality of her lovers, that she offered to rebuild Thebes at her own expence, which Alexander had destroyed, provided this inscription was placed on the walls: *Alexander diruit, sed meretrix Phryne refecit*; which was refused. See *Plin.* 34. c. 8.—There was another of the same name who was accused of impiety. When she found that she was going to be condemned, she unveiled her bosom, which so influenced her judges, that she was immediately acquitted.

PHRYNICUS, a general of Samos, who endeavoured to betray his country, &c.—A flatterer at Athens.—A tragic poet of Athens, disciple to Theſpis. He was the first who introduced a female character on the stage.

PHRYNIS was a musician of Mitylene. He was the first who obtained a musical prize at the Panathenæa at Athens. He added two strings to the lyre, which had always been used with seven by all his predecessors. He flourished about 438 years before the Christian era. We are told that he was originally a cook at the house of Hiero king of Sicily.—There was another of the same name, a writer in the reign of Commodus, who made a collection, in 36 books, of phrases and sentences from the best Greek authors, &c.

PHRYXUS (fab. hist.), was a son of Athamas king of Thebes, by Nephele. When his mother was repudiated, he was persecuted with the most inveterate fury by his step-mother Ino, because he was to sit on the throne of Athamas, in preference to the children of a second wife. His mother apprized him of Ino's intentions upon his life; or, according to others, his preceptor; and the better to make his escape, he secured part of his father's treasures, and privately left Bœotia with his sister Helle, to go to their friend and relation Æetes king of Colchis. They embarked on board a ship, or, as we are informed by the fabulous account of the poets and mythologists, they mounted on the back of a ram, whose fleece was of gold, and proceeded on their journey through the air. The height to which they were carried made Helle giddy, and she fell into the sea. Phryxus gave his sister a decent burial on the sea-shore, and after he had called the place *Helleſpont* from her name, he continued his flight, and arrived safe in the kingdom of Æetes, where he offered the ram on the altars of Mars. The king received him with great tenderness, and gave him Chalciopé his daughter in marriage. She had by him Phrontis Melas, Argos Cylindrus, whom some call *Cyturus*. He was afterwards murdered by his father-in-law, who envied him the possession of the golden fleece; and Chalciopé, to prevent her children from sharing their father's fate, sent them privately from Colchis to Bœotia, as nothing was to be dreaded there from the jealousy or resentment of Ino, who was then dead. The fable of the flight of Phryxus to Colchis on a ram has been explained by some, who observe, that the ship on which he embarked was either called by that name, or carried on her prow a figure of that

animal. The fleece of gold is accounted for, by observing that Phryxus carried away immense treasures from Thebes. Phryxus was placed among the constellations of heaven after death. The ram which carried him to Asia is said to have been the fruit of Neptune's amour with Theophane the daughter of Altis. This ram the gods had given to Athamas in order to reward his piety and religious life; and Nephele procured it for her children, just as they were going to be sacrificed to the jealousy of Ino. Phryxus's murder was some time after amply revenged by the Greeks; it having occasioned the famous expedition achieved under Jason and many of the princes of Greece, which had for its object the recovery of the golden fleece, and the punishment of the king of Colchis for his cruelty to the son of Athamas.

PTHIRIASIS, the LOUSY EVIL, from *phthir*, “a louse.” It is a lousy distemper; children are frequently its subjects, and adults are sometimes troubled with it. The increase of lice, when in a warm moist situation, is very great; but a cold and dry one soon destroys them. On the human body four kinds of lice are distinguished: 1. The *pediculi*, so called because they are more troublesome with their feet than by their bite. These are in the heads of children, especially if fore or scabby; and often in those of adults, if they are slothful and nasty. 2. Crab-lice, see *CRAB LICE*. 3. Body lice; these infest the body, and breed in the clothes of the nasty and slothful. 4. A sort which breed under the cuticle, and are found in the hands and feet: they are of a round form, and so minute as often to escape the sight: by creeping under the scarf-skin they cause an intolerable itching; and when the skin bursts where they lodge, clusters of them are found there. See *ACARUS*.

A good diet and cleanliness conduce much to the destruction of lice. When they are in the head, comb it every day; and, after each combing, sprinkle the pulv. sem. staph. agr. or coccul. Ind. among the hairs every night, and confine it with a tight cap.

Codrochius, in his treatise on lice, says, that the powdered coc. Ind. exceeds all other means; and that it may be mixed in the pulp of apple, or in lard, and applied every night to the hair. Some writers assert, that if the pulv. cort. rad. saffra. is sprinkled on the head, and confined with a handkerchief, it destroys the lice in one night.

The body-lice are destroyed by any bitter, sour, salt, or mercurial medicine, if applied to the skin.

The black soap, and the flowers called *cardamine* or *lady's smock*, are said to be specifics in all cases of lice on the human body.

PTHISIS, a species of consumption, occasioned by an ulcer in the lungs. See *MEDICINE*, n° 237, &c.

Since our article *MEDICINE* was published, Dr Beddoes has suggested † a new theory of phthisis, founded on the prevailing pneumatic doctrine in chemistry. Thinking that much cannot be gained by adhering to established principles and modes of practice, and being unawed by any pretensions to success from experience, he enters into the province of speculation. He fixes on the effect of pregnancy in suspending the progress of phthisis, as a fact which, by its mode of operation, might

Phthiriasis,
Phthisis.

† Observations on the Nature and Cure of Calculus, Scuroy, &c.

Phthisis. might suggest a method of diminishing the havoc occasioned by this distemper. We shall give his explanation of this interesting fact:

"The foetus has its blood oxygenated by the blood of the mother through the placenta. During pregnancy there seems to be no provision for the reception of an unusual quantity of oxygen. On the contrary, in consequence of the impeded action of the diaphragm, less and less should be continually taken in by the lungs. If, therefore, a somewhat diminished proportion of oxygen be the effect of pregnancy, may not this be the way in which it arrests the progress of phthisis? and if so, is there not an excess of oxygen in the system of consumptive persons? and may we not, by pursuing this idea, discover a cure for this fatal disorder?"

Dr Beddoes thinks, that this supposition is countenanced by the deficiency of oxygen in the blood of pregnant women, of asthmatic patients, and of those who labour under sea-scurvy; and by the superabundance of it in the blood of phthical persons, indicated by its colour, as well as by the aggravation of the symptoms of consumption by breathing oxygen air, and by the relief from inspiring atmospheric air mixed with carbonic acid air; and, lastly, from the small proportion of deaths among sea-faring people. Supposing acids to act by decomposition, their alleged effects in producing consumption are consistent with the author's doctrine, as well as the emaciation preceding and accompanying phthisis. From these facts, Dr Beddoes concludes, that "1. The phthical inflammation may so alter the structure of the lungs, as to cause them to transmit a more than ordinary portion of oxygen to the blood; or, 2. Some unknown cause having enabled them to transmit, or the blood itself to attract, more oxygen, an inflammation of the lungs might ensue."

From these principles, the Doctor thinks himself justified in proposing, in a disease which is incurable by present modes of practice, to diminish the supply of oxygen by the two channels through which it is introduced; namely, through the lungs, by lowering the atmospheric air with azotic or hydrogen air; and through the stomach, by giving such nourishment as contains a small portion of oxygen.

Such is Dr Beddoes's theory of consumption; on which the following remark has been made by a critic* who possesses an equal degree of candour and judgment. It is assumed by Dr Beddoes, that the blood of pregnant women has a diminished proportion of oxygen; but pregnant women have the same circumscribed spot of florid red in their countenances which is apparent in hectic. If, then, the presence of this colour be sufficient to prove an excess of oxygen in the one case, it must have the same weight in the other. Another question is, whether less oxygen be really taken in by the lungs during pregnancy? For although the diaphragm be impeded in the freedom of its action, the frequency of breathing is proportionally increased.—A third circumstance which demands attention is, in what degree the foetus has its blood oxygenated by the blood of the mother through the placenta. It appears highly probable, that the foetal blood receives a very trifling supply of oxygen from the blood of the mother; that the foetal heart

contains only a small portion of blood, which has been conveyed to the placenta; and that the blood in the heart and arteries of the foetus is not florid.—For many ingenious arguments on this subject, we may refer to Mr Coleman's Dissertation on suspended Respiration.—Leaving these things to Dr Beddoes's consideration, we will present our readers with his concluding remarks on this subject:

"The more you reflect, the more you will be convinced, that nothing would so much contribute to rescue the art of medicine from its present helpless condition, as the discovery of the means of regulating the constitution of the atmosphere. It would be no less desirable to have a convenient method of reducing the oxygen to 18 or 20 in 100, than of increasing it in any proportion. The influence of the air we breathe is as wide as the diffusion of the blood. The minutest portions of the organs of motion, sense, and thought, must be affected by any considerable change in this fluid. Whether it be that the brain must be washed by streams of arterial blood, or that the action of every organ is a stimulus to the system in general, and consequently to every other organ in particular; it is certain, that when the access of oxygen is cut off from the lungs, the functions of the brain cease: perhaps there may be a mixture of azotic and oxygen airs, more favourable to the intellectual faculties than that which is found in the atmosphere; and hence chemistry be enabled to exalt the powers of future poets and philosophers. That diseases of excitement on the one hand, and debility on the other, might be cured almost solely by a proper air, one can hardly doubt, as well as several disorders at present highly dangerous or desperate, which one cannot, upon the faith of any obvious phenomena, refer to either head. The materia medica might, therefore, undergo a still greater reduction than it has lately undergone, in consequence of the purification of medicine from its grosser absurdities; and hence the treatment of diseases be at once rendered infinitely more pleasant and more efficacious."

Our author, in a subsequent publication*, gives an account of his treating with success several cases of phthisis according to the principles of this theory. *A Letter to Erasmus Darwin, M.D.*

After distinguishing consumptions into two kinds, the florid and the pituitous or catarrhal, he observes, "that the system may be as variously affected by means of the lungs as of the stomach: that it is impossible to doubt that we are nourished by the lungs as truly as by the stomach: and that what we take in at the former entrance, becomes, like our food, a part of the substance of our solids as well as of our fluids. By the lungs we can also introduce effectual alteratives of the blood, and by consequence of all the parts nourished by the blood."

He then acquaints us more particularly with the apparatus requisite for the practice proposed. 1st, It should be able to furnish azotic, hydrogen, carbonic, and oxygen airs: our author having, as he says, "no intention to confine himself to one incurable disorder. 2dly, The reservoirs should be large, that the patients may be supplied with any quantity that their symptoms may require: and, 3dly, It is necessary to be able to mix these airs with one another, as well as with atmospheric air, in any proportion." These objects, we

* Monthly
Rev. Nov.
1793,
p. 273.

Phul
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Phyllis.

told, have been completely attained by a construction not very unlike to that employed in the gazometers of M. Lavoisier and Dr Van Marum.

PHUL, or PUL, king of Assyria, is by some historians said to be Ninus under another name, and the first founder of that monarchy: A renowned warrior. He invaded Israel in the reign of Manahem, who became tributary to him, and paid him 1000 talents of silver for a peace. Flourished 771 B. C.

PHUT, or PHUTH, the third son of Ham (Gen. x. 6.) Calmet is of opinion, that Phut peopled either the canton of Phtemphu, Phtemphuti, or Phtembuti, set down in Pliny and Ptolemy, whose capital was Thara in Lower Egypt, inclining towards Lybia; or the canton called Phtenotes, of which Buthus was the capital. The prophets often speak of Phut. In the time of Jeremiah, Phut was under the obedience of Necho king of Egypt. Nahum (iii. 9.) reckons up his people in the number of those who ought to have come to the assistance of No-ammon or Diospolis.

PHYLACTERY, in the general, was a name given by the ancients to all kinds of charms, spells, or characters, which they wore about them, as amulets, to preserve them from dangers or diseases.

PHYLACTERY particularly denoted a slip of parchment, wherein was written some text of Holy Scripture, particularly of the decalogue, which the more devout people among the Jews wore on the forehead, the breast, or the neck, as a mark of their religion.

The primitive Christians also gave the name *phylacteries* to the cases wherein they inclosed the relics of their dead.

Phylacteries are often mentioned in the New Testament, and appear to have been very common among the Pharisees in our Lord's time.

PHYLICA, BASTARD ALATERNUS; a genus of the monogynia order, belonging to the pentandria class of plants. There are six species, of which three are kept in the gardens of this country; but, by reason of their being natives of warm climates, they require to be kept in pots, and housed in winter. They are all shrubby plants, rising from three to five or six feet high, and adorned with beautiful clusters of white flowers. They are propagated by cuttings.

PHYLLANTHUS, SEA-SIDE LAUREL; a genus of the triandria order, belonging to the monœcia class of plants. There are six species, all of them natives of warm climates; and rise from 12 or 14 feet to the height of middling trees. They are tender, and cannot be propagated in this country without artificial heat.

PHYLLIS (fab. hist.), was a daughter of Sithon, or, according to others, of Lycurgus king of Thrace, who received Demophoon the son of Theseus; who, at his return from the Trojan war, had stopped on her coasts. She became enamoured of him, and did not find him insensible to her passion. After some months of mutual tenderness and affection, Demophoon set sail for Athens, where his domestic affairs recalled him. He promised faithfully to return as soon as a month was expired; but either his dislike for Phyllis, or the irreparable situation of his affairs, obliged him to violate his engagement: and the queen, grown desperate on account of his absence, hanged herself, or, according to others, threw herself down a precipice into the

sea and perished. Her friends raised a tomb over her body, where there grew up certain trees, whose leaves, at a particular season of the year, suddenly became wet as if shedding tears for the death of Phyllis. According to an old tradition mentioned by Servius, Virgil's commentator, Phyllis was changed by the gods into an almond tree, which is called *phylla* by the Greeks. Some days after this metamorphosis, Demophoon revisited Thrace; and when he heard of the fate of Phyllis, he ran and clasped the tree, which, though at that time stripped of its leaves, suddenly shot forth, and blossomed as if still sensible of tenderness and love. The absence of Demophoon from the house of Phyllis has given rise to a beautiful epistle of Ovid, supposed to have been written by the Thracian queen about the fourth month after her lover's departure.—A country woman introduced in Virgil's eclogues.—The nurse of the emperor Domitian.—A country of Thrace near mount Pangæus.

PHYSALIS, the WINTER CHERRY; a genus of the monogynia order, belonging to the pentandria class of plants. There are 16 species; of which the most remarkable is the alkekengi, or common winter-cherry. This grows naturally in Spain and Italy. The roots are perennial, and creep in the ground to a great distance if they are not confined. These, in the spring, shoot up many stalks, which rise to the height of a foot or more, garnished with leaves of various sorts; some of which are angular and obtuse, some oblong and sharp pointed, with long foot stalks. The flowers are produced from the wings, standing upon slender foot-stalks; are of a white colour, and have but one petal. They are succeeded by round berries about the size of small cherries, inclosed in an inflated bladder, which turns red in autumn, when the top opens and discloses the red berry, which is soft, pulpy, and filled with flat kidney-shaped seeds. Soon after the fruit is ripe, the stalks decay to the root. The plant is easily propagated, either by seeds or parting the roots.

PHYSALUS. See SCOLOPENDRA.

PHYSETER, or SPERMACEI-FISH, in zoology, a genus belonging to the order of cetæ. There are four species; the most remarkable are,

1. The microps, or black-headed cachalot, with a long fin on the back, and the upper jaw considerably longer than the under one. A fish of this kind was cast ashore on Cramond isle, near Edinburgh, December 22. 1769; its length was 54 feet; the greatest circumference, which was just beyond the eyes, 30: the upper jaw was five feet longer than the lower, whose length was ten feet. The head was of a most enormous size, very thick, and above one-third the size of the fish: the end of the upper jaw was quite blunt, and near nine feet high: the spout-hole was placed near the end of it. The teeth were placed in the lower jaw, 23 on each side, all pointing outwards; in the upper jaw, opposite to them, were an equal number of cavities, in which the ends of the teeth lodged when the mouth was closed. One of the teeth measured eight inches long, the greatest circumference the same. It is hollow within-side for the depth of three inches, and the mouth of the cavity very wide: it is thickest at the bottom, and grows very small at the point, bending very much; but in some the flexure is more than in others. These, as well as the teeth of all

Phyialis
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Physeter.

Physician. all other whales we have observed, are very hard, and cut like ivory. The eyes are very small, and remote from the nose. The pectoral fins were placed near the corners of the mouth, and were only three feet long: it had no other fin, only a large protuberance on the middle of the back. The tail was a little forked, and 14 feet from tip to tip. The penis seven feet and a half long. Linnæus informs us, that this species pursues and terrifies the porpoises to such a degree as often to drive them on shore.

2. The catodon, or round headed cachalot, with a fistula in the snout, and having no back-fin. Of this species, 102 of different sizes were cast ashore at one time on one of the Orkney Isles, the largest 24 feet in length. The head is round, the opening of the mouth small. Sibbald says it has no spout-hole, but only nostrils: But Mr Pennant is of opinion, that the former being placed at the extremity of the nose, has been mistaken by him for the latter. Some teeth of this species are an inch and three quarters long, and in the largest part of the thickness of one's thumb. The top is quite flat, and marked with concentric lines; the bottom is more slender than the top, and pierced

with a small orifice: instead of a back fin, there was a rough space.

For the method of extracting the spermaceti from the brain of these creatures, see the article SPERMACETI.

PHYSIC, or **PHYSICK**, the art of healing; properly called **MEDICINE**. The word is formed from the Greek *phusis*, "nature;" in regard medicine consists principally in the observation of nature. See **PHYSICS** and **MEDICINE**.

PHYSICAL, something belonging to, or really existing in, nature. In this sense we say a physical point, in opposition to a mathematical one, which only exists in the imagination; a physical substance or body, in opposition to spirit, or metaphysical substance, &c.

PHYSICIAN, a person who professes medicine, or the art of healing diseases. See **MEDICINE**.

PHYSICIANS, College of, in London and Edinburgh. See **COLLEGE of Physicians**.

PHYSICO-MATHEMATICS, includes those branches of physic which, uniting observation and experiment to mathematical calculation, undertake to explain the phenomena of nature.

Physic
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Physico-
Mathema-
tics.

P H Y S I C S,

1
General de-
finition of
physica.

TAKEN in its most enlarged sense, comprehends the whole study of nature; and **NATURAL PHILOSOPHY** is a term of the same extent: but ordinary language, and especially in this country, employs both of these terms in a much narrower sense, which it is proper in this place to determine with some precision.

2
A more
particular
explanation
of the term.

Under the article **PHILOSOPHY**, we gave a particular account of that view of nature in which the objects of our attention are considered as connected by causation; and we were at some pains to point out the manner in which this study may be successfully cultivated. By a judicious employment of the means pointed out in that article, we discover that the objects of our contemplation compose an **UNIVERSE**, which consists, not of a number of independent existences solitary and detached from each other, but of a number of substances connected by a variety of relations and dependencies, so as to form a whole which may with great propriety be called the **SYSTEM OF NATURE**.

This assembling of the individual objects which compose the universe into one system is by no means the work of a hasty and warm fancy, but is the result of sober contemplation. The natural historian attempts in vain to describe objects, by only informing us of their shape, colour, and other sensible qualities. He finds himself obliged, in describing a piece of marble, for instance, to tell us that it takes a fine polish; that it strikes fire with steel; that it burns to quicklime; that it dissolves in aquafortis, and is precipitated by alkalis; that with vitriolic acid it makes gypsum, &c. &c. &c. and thus it appears that even the description of any thing, with the view of ascertaining its specific nature, and with the sole purpose of discrimination, cannot be accomplished without

taking notice of its various relations to other things. But what do we mean by the *nature* of any thing? We are ignorant of its essence, or what makes it that thing and no other thing. We must content ourselves with the discovery of its *qualities* or *properties*; and it is the assemblage of these which we call its *nature*. But this is very inaccurate. These do not constitute its essence, but are the consequences of it. Yet this is all we shall ever know of its nature. Now the term *property* is nothing but a name expressing some relation which the substance under consideration has to other things. This is true of all such terms. Gravity, elasticity, sensibility, gratitude, and the like, express nothing but certain *matters of fact*, which may be observed respecting the object of our contemplation in different circumstances of situation with regard to other things. Our distinct notions of individuals, therefore, imply their relations to other things.

The slightest observation of the universe shows an evident connection between all its parts in their various properties. All things on this earth are connected with each other by the laws of motion and of mind. We are connected with the whole of the solar system by gravitation. If we extend our observations to the fixed stars, the connection seems to fail; but even here it may be observed. Their inconceivable distance, it is true, renders it impossible for us to obtain any extensive information as to their nature. But these bodies are connected with the solar system by the sameness of the light which they emit with that emitted by our sun or any shining body. It moves with the same velocity, it consists (in most of them at least) of the same colours, and it is reflected, refracted, and inflected, according to the same laws.

In this unbounded scene of contemplation, our attention will be directed to the different classes of objects

Introduc-
tion.

3
All parts of
the universe
evidently
connected
in their va-
rious pro-
perties.

Introduc-
tion.

4
Our atten-
tion natu-
rally di-
rected in
the first in-
stance to
our fellow-
men.

5
Nature of
intention.

jects nearly in proportion to the interest we take in them. There is nothing in which we are so much interested as our fellow men; and one of the first steps that we make in our knowledge of nature, is an acquaintance with them. We learn their *distinctive* nature by attending to their *characteristic* appearances; that is, by observing their actions. We observe them continually producing, like ourselves, certain changes in the situation or condition of surrounding objects; and these changes are evidently directed to certain ends *which respect themselves*. Observing this subserviency of the effects which they produce to their own accommodation, we consider this adjustment of means to ends as the effect of an INTENTION, as we experience it to be in our own case, where we are conscious of this intention, and of these its effects. We therefore interpret those actions of other men, where we observe this adjustment of means to ends, as marks or signs of intention in them similar to our own. And thus a quality, or power, or faculty, is *supposed* in them by means of its sign, although the quality itself is not *immediately* cognisable by our senses. And as this intention in ourselves is accompanied by perception of external objects, knowledge of their properties, desire of good, aversion from evil, volition, and exertion, without all of which we could not or would not perform the actions which we daily perform, we *suppose* the same perception, knowledge, desire, aversion, volition, and exertion in them.

Thus, by the constitution of our mind, we consider the employment of means, by which ends terminating in the agent are gained, as the natural signs of design or intention. ART, therefore, or the employment of means, is the natural sign of intention; and wherever we observe this adjustment of means to ends, we infer the agency of design.

A small acquaintance with the objects around us, obliges us to extend this inference to a great number of beings besides our fellow men, namely, to the whole animal creation: for in all we observe the same subserviency to the ends of the agent, in the changes which we find them continually producing in the objects around them. These changes are all adjusted to their own well being. In all such cases, therefore, we are forced, by the constitution of our own minds, to infer the existence of design or intention in these beings also.

But in numberless changes produced by external objects on each other, we observe no such fitness in the effects, no such subserviency to the well-being of the agent. In such cases, therefore, we make no such inference of thought or design.

6
All objects
divided in-
to thinking
and un-
thinking
beings.

Thus, then, there is presented to our observation an important distinction, by which we arrange all external objects into two classes. The first resembles ourselves, in giving external marks of that thought or intention of which we are conscious; and we *suppose* in them the other properties which we discover in ourselves, but cannot *immediately* observe in them, viz. thought, perception, memory, foresight, and all that collection of faculties which we feel in ourselves, and which constitute the animal. The other class of objects exhibit no such appearances, and we make no such inference. And thus we divide the whole of external nature into the classes of THINKING and UN-THINKING beings.

Our first judgments about these classes will be very

inaccurate; and we will naturally ascribe the differences, which we do not very well understand, to the differences in organical structure, which we clearly observe. But when we have knocked down or perhaps smothered an animal, we find that it no longer gives the former marks of thought and intention, and that it now resembles the class of unthinking beings: And yet it still retains all that fitness of organical structure which it had before; it seems only to want the intention and the will. This obliges us to conclude that the distinction does not arise from a difference in organical structure, but from a distinct substance common to all thinking beings, but separable from their organical frame. To this substance we ascribe thought, intention, contrivance, and all that collection of faculties which we feel in ourselves. To this substance in ourselves we refer all sensations, pleasures, pains, remembrances, desires, purposes; and to this aggregate, however imperfectly understood, we give the name MIND. Our organical frame, which seems to be only the instrument of information and operation to the mind, we call our body.

As the animating principle is not, like our body, the immediate object of the senses, we naturally conceive it to be a substance essentially different from those which are the objects of our senses. The rudest people have shown a disposition to form this conclusion. Ob- serving that animal life was connected with breathing, it was natural to imagine that breathing was living, and that breath was life. It is a remarkable fact, that in most languages the term for expressing *breath* is at least one of the terms for expressing the soul; *πνευμα*, *spiritus*, in the Hebrew, Greek, and Latin, express both; *gheist* or *ghost*, in the Teutonic, comes from *gheisen*, to "breathe or sigh;" *dūcha* or *dūba*, "the soul," in Slavonic, comes from *duichat*, "to breathe;" so in the Gaelic *does anal* come from *anam*; and the same relation is found between the two words in the Malay and other eastern languages. We believe that most persons can recollect some traces of this notion in their early conceptions of things; and many who do not consider themselves as uncultivated, believe that the soul quits the body *along with the last breath*. Among the Tartar nations hanging is considered with particular horror, on account of the ungraceful and filthy exit which the soul is obliged to make from the body.

But the observation of the same appearances of thought and intention in fishes and other animals which do not breathe, would soon show that this was but a rude conception. Very little refinement indeed is necessary to convince us that air or breath cannot be the substance which thinks, wishes, and designs; and that the properties of this substance, whatever it is, must be totally different from, and incompatible with, any thing that we know of the immediate objects of our senses.

Hence we are led to conclude that there are two kinds of substances in nature: One, which is the principle of sensation; and therefore cannot be the object of our senses, any more than light can be the object of the microscope. This substance alone can feel, think, desire, and propose, and is the object of reflection alone. The objects of our senses compose the other class, and therefore can have none of the other properties which are not cognoscible by the senses. These have all the properties

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7
How we
come to the
knowledge
of mind.

8
The nature
of mind as
understood
by mankind
in rude
ages.

9
Their opi-
nions not
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Of the two
kinds of
substances
in nature,
one is the
object of
reflection
alone, the
other of the
senses.

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properties which our senses can discover; and we can have no evidence of their having any other, nor indeed any conception of their having them. This class is not confined to the unorganized masses of matter; for we see that the bodies of animals lose after death that organical form, and are assimilated to all the rest of unthinking beings. It has arisen from such views as this, that while all nations have agreed to call this class of objects by the name *body*, which originally expresses our organical frame, some nations, farther advanced in cultivation or refinement, have contrived an abstract term to express this general substance of which all inanimate beings are composed. Such a term we have in the words *materies*, *ύλη*.

II
The distinc-
tion be-
tween ma-
terial and
immaterial
substances
is very im-
portant.

Matter, then, is that substance which is immediately cognoscible by our senses. Whatever, therefore, is not thus immediately cognoscible by our senses is not material, and is expressed by a negative term, and called *immaterial*: hence it is that mind is said to be immaterial. It is of importance to keep in mind this distinction, merely grammatical. Little more is necessary for detecting the sophisms of Helvetius, Mirabeau, and other sages of the Gallic school, who have been anxious to remove the ties of moral and religious obligation by lowering our conceptions of our intellectual nature. It will also serve to show how hastily they have formed their opinions who have ascribed to the immediate agency of mind all those relations which are observed in the actions of bodies on each other at a distance. The connecting principles of such relations *e distante* (if there are any such), are not the immediate objects of our senses: they are therefore immaterial. But it does not follow that they are minds. There may be many immaterial substances which are not minds. We know nothing of any object whatever but by the observation of certain appearances, which suggest to our minds the existence and agency of its qualities or powers. Such phenomena are the natural signs of these qualities, and it is to those signs that we must always have recourse when we wish to conceive without ambiguity concerning them. What is the characteristic phenomenon of mind, or what is the *distinguishing* quality which brings it into view? It is *intention*: and it may be asserted with the utmost confidence, that we have no other mark by which mind is immediately suggested to us, or that would ever have made us suppose that there existed another mind besides our own. The *phenomenon* by which this quality is suggested to us is *art*, or the employment of means to gain ends; and the mark of art is the supposed conduciveness of these ends to the well-being of the agent. Where this train is not observed, design or intention is never thought of; and therefore where intention is not perceived in any immaterial substance, if any such has ever been observed, it is an abuse of language to call it mind. We do not think that even perception and intelligence intitle us to give the name mind to the substance in which they are inherent, because it is from marks of intention alone that we infer the existence of mind; and although these must be accompanied with perception and intelligence, it does not follow that the substance which can perceive and understand must also desire and propose. However difficult we may find it to separate them, they are evidently separable in imagination. And let not this

assertion be too hastily objected to; for the separation *has been made* by persons most eminent for their knowledge and discernment. When Leibnitz ascribed to his *MONADES*, or what we call the ultimate *ATOMS* of matter, a perception of their situation in the universe, and a motion precisely suited to this perception, he was the farthest in the world from supposing them animated or endowed with minds. It is true indeed that others, who think and call themselves philosophers, are much more liberal in their application of this term. A modern author of great metaphysical eminence says, "I call that *mind* which moves, and that *body* which is moved." This class of philosophers assert that no motion whatever is begun except by the agency of an animating principle, which (after Aristotle) they call *Nature*, and which has in these days been exalted to the rank of a god. All this jargon (for it is nothing else) has arisen from the puzzle in which naturalists think themselves involved in attempting to explain the production of motion in a body at a distance from that body which is conceived as the cause of this motion. After having been reluctantly obliged, by the reasonings of Newton, to abandon their methods of explaining such phenomena by the impulses of an intervening fluid, nothing seemed left but the assertion that these motions were produced by minds, as in the case of our own exertions. These explanations (if they deserve the name) cannot be objected to in any other way than as an abuse of language, and as the introduction of an unmeaning jargon. We have, and can have, no notion of mind different from those of our own minds; and we discover the existence of other minds as we discover the existence of bodies, by means of phenomena which are characteristic of minds, that is, which resemble those phenomena that follow the exertion of our own mental faculties, that is, by the employment of means to attain selfish ends; and where such appearances are not observed, no existence of a mind is inferred. When we see a man fall from the top of a house, and dash out his brains on the pavement, we never ascribe this motion to his mind. Although the fitness of many of the celestial motions for most important purposes makes us suppose design and contrivance somewhere, and therefore a *Supreme Mind*, we no more think of inferring a mind in the earth from the fitness of its motions for purposes most beneficial to its inhabitants, than of inferring a mind in a bit of bread from its fitness for nourishing our bodies. It is not from the mere motions of animals that their minds are inferred, but from the conduciveness of these motions to the well-being of the animal.

The term mind therefore, in the *ordinary language* of all men, is applied to what desires and wills at the same time that it perceives and understands. If we call that mind which *produces motion*, we must derive our notions of its qualities or attributes from observing their effects. We must therefore discover the general laws by which they act, that is, the general laws observed in those motions which we consider as their effects. Now these are the general laws of motion; and in none of these can we find the least coincidence with what we are accustomed to call the laws of mind. Nay, it has been the total want of similarity which has given rise to the distinction which all men, in all ages, and

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The mind is not that which produces motion, but that which desires and wills.

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and countries, have made between mind and matter. This distinction is found in all languages; and it is an unpardonable liberty which men take with languages when they use a *term of distinction*, a *specific term*, to express things of a different species. What these authors have been pleased to call *mind*, the whole world besides have called by another name, *force*; which, though borrowed from our own exertions, is yet sufficiently distinctive, and never leads us to confound things that are different, except in the language of some modern philosophers, who apply it to the laws of the agency of mind; and, when speaking of the force of motives, &c. commit the same mistakes which the followers of Aristotle commit in the use of the term *mind*. *Force*, in the language of these philosophers, means what connects the operations of mind; as *mind*, in the language of Lord Monboddo, is that which connects the operations of body.

13
The principle of motion not distinct from matter and mind.

Those are not less to blame who consider this *Nature* of Aristotle, this principle of motion, as an existence or substance different both from matter and from the minds of intelligent creatures. Aristotle calls it in some places *ἄσπερ ψυχή*. He might with equal propriety, and equal consistency with his other doctrines, have called mind *ἄσπερ τῆος*, or an *ἄσπερ δύναμις*. Besides, we have no evidence for the separability of this *ἄσπερ ψυχή* from body as we have for the separability of such minds as our own, the genuine *ψυχαί*. Nay, his whole doctrines, when maturely considered, assume their absolute inseparability.

14
Elemental minds are an abuse of language.

This doctrine of elemental minds, therefore, as the immediate causes of the phenomena of the material world, is an abuse of language. It is a jargon; and it is a frivolous abuse, for it offers no explanation whatever. The phenomena are totally unlike the phenomena of ordinary minds, and therefore receive no explanation from them; and since our knowledge of these *quasi* minds must be derived entirely from the phenomena, it will be precisely the same, although we express it in common language. We shall not indeed raise the wonder of our hearers, as those do who fill the world with minds which they never suspected to exist; but we shall not bewilder their imaginations, confound their ideas, and mislead their judgments.

15
The dreadful consequences of materialism.

We flatter ourselves that our readers will not think these observations unseasonable or misplaced. Of all mistakes that the naturalist can fall into, there is none more fatal to his progress in knowledge than the confounding things which are essentially different; and of all the distinctions which can be made among the objects of our contemplation, there is none of equal philosophical importance with this between mind and matter: And when we consider the consequences which naturally follow from this confusion of ideas, and particularly those which follow from sinking the mental faculties of man to a level with the operations of mechanics or chemistry, consequences which the experience of the present eventful day shows to be destructive of all that is noble or desirable in human nature, and of all that is comfortable in this life, and

which blasts every hope of future excellence—we cannot be too anxious to have this capital distinction put in the plainest point of view, and expressed in the most familiar characters, “so that he who runneth may read.” When we see the frenzy which the reasoning pride of man has raised in our neighbourhood, and hear the dictates of philosophy incessantly appealed to in defence of whatever our hearts shudder at as shocking and abominable; and when we see a man (A), of great reputation as a naturalist, and of professed humanity and political moderation, congratulating his countrymen on the rapid improvement and almost perfection of philosophy; and after giving a short sketch of the constitution of the visible universe, summing up all with a table of elective attractions, and that particular combination and mode of crystallization which constitutes God (*horresco referens!*)—is it not full time for us to stop short, and to ask our own hearts “whither are you wandering?”—But sound philosophy, reasoning from effects to their causes, will here listen to the words of our sacred oracles: “By their fruits ye shall know them. Do men gather grapes of thorns, or figs of thistles?” The absurd consequences of the sceptical philosophy of Berkley and Hume have been thought, by men of undoubted discernment, sufficient reasons for rejecting it without examination. The no less absurd and the shocking consequences of the mechanical philosophy now in vogue should give us the same abhorrence; and should make us abandon its blood-stained road, and return to the delightful paths of nature, to survey the works of God, and feast our eyes with the displays of mind, which offer themselves on every hand in designs of the most extensive influence and the most beautiful contrivance. Following the guidance of heavenly wisdom, we shall indeed find, that “all her ways are ways of pleasantness, and all her paths are peace.”

Such is the scene of our observation, the subject of philosophical study. Its extent is almost unbounded, reaching from an atom to God himself. It is absolutely necessary for the successful cultivation of this immense field of knowledge that it be committed to the care of different cultivators, and that its various portions be treated in different ways: and, accordingly, the various tastes of men have given this curiosity different directions; and the study, like all other tasks, has been promoted by this division of labour.

Some philosophers have attended only to the appearances of fitness which are exhibited in every quarter of the universe; and by arranging these into different classes, and interpreting them as indications of thought and intention, have acquired the knowledge of many classes of sentient and intelligent beings, actuated by propensities, and directed by reason.

While the contemplation of these appearances indicates thought and design in any individual of one of these classes, and brings its propensities and purposes of action, and the ends gained by these actions, into view, the contemplation of these propensities, purposes, and ends, occasions an inference of a much more general

(A) M. de la Metherie, editor of the *Journal de Physique*. See his prefaces to the volumes for 1792 and 1793, January and July.

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ral kind. All these intelligent beings give indications of knowledge and of power; but their knowledge bears, in general, no proportion to their power of producing changes in nature, and of attaining important ends; and their power is neither always, nor in the most important cases, the consequence of their knowledge. Where the effect of their actions is most eminently conducive to their important interests, the power of attaining these valuable ends is generally independent on any attention to the fitness of the means, and the exertion is frequently made without even thinking of the important end. The well-being of the individual is secured against any danger from its ignorance, indolence, or inattention, by an instinctive propensity, which leads it to the performance of the necessary action, which is thus made immediately and ultimately desirable, without any regard to its ultimate and important end. Thus, in our own nature, the support of animal life, and the improvement of the means of subsistence by a knowledge of the objects which surround us, are not intrusted to our apprehensions of the importance of these ends, but are committed to the surer guides of hunger and curiosity.

18
There is a connection between the individuals of a class of animals different from that of resemblance.

The same observers discover a connection between the individuals of a class, different from that which arises from the mere resemblance of their external appearance, or even of their propensities and pursuits; the very circumstances which produced the classification. They observe, that these propensities are such, that while each individual seeks only its own enjoyment, these enjoyments are in general such as contribute to the support of the species and the enjoyment of other individuals. Thus, in the classes of animals, and in human nature, the continuance of the race, and the enjoyment of the whole, are not intrusted to the apprehension we entertain of the importance of these ends, but are produced by the operation of sexual love and the love of society.

19
There is also a link of connection between sentient beings of different classes.

The same observers find that even the different classes of sentient beings are connected together; and while the whole of each class aim only at their own enjoyment, they contribute, in some way or other, to the well-being of the other classes. Even man, the selfish lord of this sublunary world, is not the unconnected inhabitant of it. He cannot, in every instance, reap all the fruits of his situation, without contributing to the enjoyment of thousands of the brute creation. Nay, it may be proved to the satisfaction of every intelligent man, that while one race of animals, in consequence of its peculiar propensities, subsists by the destruction of another, the sum total of animal life and enjoyment is prodigiously increased. See a very judicious dissertation on this curious and puzzling subject, intitled *A Philosophical Survey of the Animal Creation*; where it appears that the increase of animal life and enjoyment which is produced by this means, beyond what could possibly obtain without it, is beyond all conception. See likewise the last edition of *King's Origin of Evil*, by Dr Law late bishop of Carlisle.

20
The end of this connection is the accumulation of happiness.

Thus the whole assemblage seems connected, and jointly employed in increasing the sum total of possible happiness. This fitness of the various propensities of sentient and intelligent beings, this subserviency to a general purpose, strikes these observers as a mark of intention, evidently distinct from, and independent of,

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all the particular intentions, and superior to them all; and thus it irresistibly leads them to infer the existence of a SUPREME MIND, directing the whole of this INTELLECTUAL SYSTEM, while the individuals of which it consists appear the unconscious instruments in the hand of a great Artist, with which he executes his grand and beneficent purposes.

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tion.

But the observation goes yet further. The bodies of the inanimate creation are not only connected with each other by a mutual dependence of properties, and the relation of causation, but they are also connected with the sentient beings by a subserviency to their purposes of enjoyment. The philosopher observes that this connection is admirably kept up by the constancy of natural operations and the expectations of intelligent beings. Had either of these circumstances been wanting, had either the operations of nature been without rule, or had sentient beings no perception or expectation of their uniformity; the subserviency would be totally at an end. This adjustment, this fitness, of which the effect is the enjoyment of the sentient inhabitants of the universe, appear to be the effect of an intention of which this enjoyment is the final cause. This constancy therefore in the operations of nature, both in the intellectual and material world, and the concomitant expectation of sentient beings, appear the effects of laws imposed on the different parts of the universe by the Supreme Mind, who has formed both these classes of beings so admirably suited to each other.

21
All nature, animate and inanimate, thinking and unthinking, are connected.

To such observers the world appears a WORK OF ART, a system of means employed for gaining certain proposed ends, and it carries the thoughts forward to an ARTIST; and we infer a degree of skill, power, and good intention in this Artist, proportioned to the ingenuity, extent, and happy effect which we are able to discern in his works. Such a contemplation of nature, therefore, terminates in NATURAL THEOLOGY, or the discovery of the existence and attributes of GOD.

22
The origin of natural theology.

Our notions of this Supreme Mind are formed from the indications of design which we observe, and which we interpret in the same way as in the actions of men. These notions, therefore, will differ from our notions of other minds only in the degrees which we are able to observe, and which we assign to these faculties; for the phenomenon or the effect is not only the mark, but also the measure of its supposed cause. These degrees must be ascertained by our own capacity of appreciating the extent, the multiplicity, and the variety of the contrivance. Accordingly, the attributes of the Supreme Mind, in the theological creed of a rude Indian, are much more limited than in that of a European philosopher. In proportion as our understandings are enlarged, and as our acquaintance with the operations of nature around us is extended, we shall perceive higher degrees of power, of skill, and of kind intention: and since we find that the scene of observation is unbounded, we cannot affix any boundaries to these attributes in our own imagination, and we are ready to suppose that they are infinite or unbounded in their own nature. When our attentive survey of this universe, and a careful comparison of all its parts, as far as we can understand or appreciate them, have made us conclude that it is one design, the work of one

23
Our mode of reasoning on the operations of God.

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Artist;

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24
The system
of nature
is govern-
ed by ge-
neral laws.

Artist; we are under the necessity of inferring, that, with respect to *this universe*, his power, wisdom, and benevolence, are indeed infinite.

25
The nature
and pro-
gress of the
study of
mind.

When men have been led to draw this conclusion from the appearances of fitness which are observed everywhere around them, they consider that constancy which they observe in natural operations, whether in the material or the intellectual system, and that expectation of, and confidence in, this constancy, which renders the universe a source of enjoyment to its sentient inhabitants, as the consequences of laws imposed by the Almighty Artist on his works, in the same manner as they would consider the constancy in the conduct of any people as the consequences of laws promulgated and enforced by the supreme magistrate.

26
The rise of
moral sen-
timents and
of moral
duty.

There can be no doubt of this view of nature being extremely captivating, and likely to engage the curiosity of speculative men; and it is not surprising that the phenomena of mind have been keenly studied in all ages. This part of the study of nature, like all others, was first cultivated in subserviency to the wants of social life; and the general laws of moral sentiment were the first phenomena which were considered with attention. This gradually ripened into a regular system of moral duty, accompanied by its congenial study, the investigation or determination of the *summum bonum*, or the constituents of human felicity; and these two branches of intellectual science were always kept in a state of association by the philosophers of antiquity. Jurisprudence, the science of government, legislation, and police, were also first cultivated as arts, or at least in immediate subserviency to the demands of cultivated society; and all these so nearly related parts of the study of human nature, had made a very considerable progress, in the form of maxims or precepts, for directing the conduct, before speculative men, out of mere curiosity, treated them as subjects of philosophical study. Our moral sentiments, always involving a feeling of obligation, are expressed in a language considerably different from the usual language of pure philosophy, speaking of things which *ought to be* rather than of things which *are*; and this distinction of language was increased by the very aim of the writers, which was generally to influence the conduct as well as the opinions of their scholars. It was reserved for modern times to bring this study into the pure form of philosophy, by a careful attention to the phenomena of moral sentiment, and classing these according to their generality, and ascertaining their respective ranks by an appeal to experiment, that is, to the general conduct of mankind: and thus it happens that in the modern treatises on ethics, jurisprudence, &c. there is less frequent reference made to the *officia* or duties, or to the constituents of the *summum bonum*, than among the ancients, and a more accurate description of the human mind, and discrimination of its various moral feelings.

27
The origin
of logic and
other in-
tellectual
sciences.

It was hardly possible to proceed far in these disquisitions without attending to the powers of the understanding. Differences of opinion were supported by reasonings, or attempts to reasoning. Both sides could not be in the right, and there must be some court of appeals. Rules of argumentation behaved to be acquiesced in by both parties; and it could hardly

escape the notice of some curious minds, that there were rules of truth and falsehood as well as of right and wrong. Thus the human *understanding* became an object of study, first in subserviency to the demands of the moralists, but afterwards for its own sake; and it gradually grew up into the science of logic. Still further refinement produced the science of metaphysics, or the philosophy of universals. But all these were *in fact* posterior to the doctrines of morals; and disquisitions on beauty, the principles of taste, the precepts of rhetoric and criticism, were the last additions to the study of the phenomena of mind. And now, since the world seems to have acquiesced in the mode of investigation of general laws by experiment and observation, and to agree that this is all the knowledge that we can acquire of any subject whatever, it is to be expected that this branch of philosophical discussion will attain the same degree of improvement (estimated by the coincidence of the doctrines with fact and experience) that has been attained by some others.

The occupations, however, of ordinary life have often directed our efforts towards material objects, and engaged our attention on their properties and relations; and as all sciences have arisen from arts, and were originally implied in the maxims and precepts of those arts, till separated from them by the curiosity of the speculative, the knowledge of the material system of nature was possessed in detached scraps by the practitioners in the various arts of life long before the *natural philosopher* thought of collecting them into a body of scientific doctrines. But there have not been wanting in all ages men of curiosity who have been struck by the uniformity of the operations of nature in the material world, and were eager to discover their causes.

Accordingly, while the moralists and metaphysicians turned their whole attention to the phenomena of mind, and have produced the sciences of pneumatology, logic, ethics, jurisprudence, and natural theology, these observers of nature have found sufficient employment in considering the phenomena of the material world.

The bodies of which it consists are evidently connected by means of those properties by which we observe that they produce changes in each other's situation. This assemblage of objects may therefore be justly called a system. We may call it the MATERIAL SYSTEM. It is frequently termed NATURE; and the terms NATURAL APPEARANCES, NATURAL CAUSES, NATURAL LAWS, have been generally restricted to those which take place in the material system. This restriction, however, is improper, because there is no difference in the manner in which we form our notions of those laws, and reason from them, both with respect to mind and body. Or if there is to be any restriction, and if any part of the study of the universe is to be excluded in the application of these terms, it is that part only which considers moral obligation, and rather treats of what *ought to be* than of what *is*. As has been already observed, there is a considerable difference in the language which must be employed; but still there is none in the principles of investigation. We have no proof for the extent of any moral law but

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The par-
tial prac-
tice of na-
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preceded
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ence.

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The nature
of the ma-
terial sys-
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terms.

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The unre-
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some of
these terms
are used,
and its bad
consequen-
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but an appeal to the feelings of the hearts of men, indicated by the general laws or facts which are observed in their actions.

But this is only a question of the propriety of language. And no great inconvenience would arise from the restriction now mentioned if it were scrupulously adhered to; but unfortunately this is not always the case. Some authors use the term *natural law* to express every coincidence of fact; and this is certainly the proper use of the term. The French writers generally use the term *loi physique* in this enlarged sense. But many authors, misled by, or taking advantage of, the ambiguity of language, after having established a law founded on a copious and perhaps unexcepted induction of the phenomena of the material system (in which case it must be considered in its restricted sense), have, in their explanation of phenomena, extended their principle much farther than the induction on which they had founded the existence of the physical law. They have extended it to the phenomena of mind, and have led their followers into great and dangerous mistakes. Languages, like every other production of human skill, are imperfect. They are deficient in terms, and are therefore figurative. The most obvious, the most frequent, and the most interesting uses of language, have always produced the appropriated terms, and the progress of cultivation has never completely supplied new ones. There are certain analogies or resemblances, or certain associations of ideas, so plain, that a term appropriated to one very familiar object will serve to suggest another analogous to it, when aided by the concomitant circumstances of the discourse; and this with sufficient precision for the ordinary purposes of social communication, and without leading us into any considerable mistakes: and it is only the rare and refined disquisitions of the curious speculatist that bring the poverty and imperfection of language into view, and make us wish for words as numerous as our thoughts. There is hardly a sentence, even of common discourse, in which there are not several figures either of single words or of phrases; and when very accurate discrimination is required, it is almost impossible to find words or phrases to express distinctions which we clearly feel. We believe it impossible to express, by the scanty vocabulary of the Hebrews, the nice distinctions of thought which are now familiar to the European philosopher. In nothing does this imperfection of language appear so remarkably as in what relates to mind. Being a late subject of separate discussion, and interesting only to a few speculatists, we have no appropriated vocabulary for it; and all our disquisitions concerning its operations are in continual metaphor or figure, depending on very slight analogies or resemblances to the phenomena of the material world. This makes the utmost caution necessary; and it justifies the British philosophers, who have been the most successful in prosecuting the study of the intellectual system, for having, almost without exception, restricted the terms *natural laws*, *natural causes*, *natural philosophy*, and such like, to the material system. With us pneumatology makes no part of physics. And we may venture to affirm, that the sciences have fared better by the restriction of the terms. In no country has the spirit of liberal discussion been more encouraged and

indulged than in Britain; and her philosophers have been equally eminent in both branches of science. Their performances in ethics, jurisprudence, and natural theology, are considered by all our neighbours as the fountains of knowledge on these subjects; and Locke and Clarke are names no less familiar on the continent than Newton. The licentious and degrading doctrines of the Gallican school have as yet made little impression here; and man is still considered among us as a glorious creature, born to, and fitted for, the noblest prospects.

Physics, then, is with us the study of the material system, including both natural history and philosophy. The term is not indeed very familiar in our language; and in place of *physicus* and *disciplina physica*, we more generally use the terms *naturalist* and *natural knowledge*. The term *natural philosophy*, in its common acceptation, is of less extent. The field of physical investigation is still of prodigious extent; and its different quarters require very different treatments, make very different returns, and accordingly have engaged in their particular cultivation persons of very different talents and tastes. It is of some importance to perceive the distinctions, and to see how the wants and propensities of men have led them into the different paths of investigation; for, as has been more than once observed, all sciences have sprung from the humble arts of life, and both go on improving by means of a close and constant correspondence.

All the phenomena of the material system may be arranged into two classes, distinguished both by their objects and by the proper manner of treating them.

The first class comprehends all the appearances which are exhibited in the *sensible motions* of bodies, and their actions on each other producing *sensible motion*.

The second class comprehends the appearances which are exhibited in the *insensible motions* and actions of the invisible particles of matter.

Of the phenomena of the first class we have examples in the planetary motions, the motions of heavy bodies, the phenomena of impulse, the motions and actions of machines, the pressure and motions of fluids, the sensible actions of magnetical and electrical bodies, and the motions of light.

We have examples of the second class in the phenomena of heat and mixture, and those exhibited in the growth of animals and vegetables, and many phenomena of solid, fluid, magnetical, electrical, and luminous bodies, in which no change of place can be observed.

Thus it appears that there is a distinction in the phenomena sufficiently great to warrant a division of the study, and to make us expect a more rapid improvement by this division. Nay, the division has been made by nature herself, in the acquaintance which men have attained with her operations without study, before science appeared, and while art constituted all our knowledge.

Before man had recourse to agriculture as the most certain means of procuring subsistence, our acquaintance with external substances was principally that of the natural historian; consisting of a knowledge of their fitness for food, medicine, or accommodation, their places of growth or habitation, and the means of

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physics de-
fined as it
is generally
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Examples
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procuring them, depending on their manner of life or existence. It required a studied attention to these circumstances to give rise to agriculture, which therefore generally made its appearance after men had been in the practice of keeping flocks; by which means they were more at their ease, and had some leisure to attend to the objects around them, and in particular to those circumstances of soil and weather which affected the growth of their pasture.

When agriculture and a rude medicine were thus established, they were the first *arts* which had their foundation in a *system of laws*, by which the operations of nature were observed to be regulated; and with these arts we may begin the *general study of nature*, which were thus divided into two different branches.

The rude physician would be at first a collector of *specifics*; but by degrees he would observe resemblances among the *operations* of his drugs, and would class them according to these resemblances. He would thus come to attend less to the drug than to its mode of operation; and would naturally speculate concerning the connection between the operation and the economy of animal life. His art now becomes a scientific system, connected by principle and theory, all proceeding on the observation of changes produced by one kind of matter on another, but all out of sight. The frequent recourse to the vegetable kingdom for medicines would cause him to attend much more minutely to the few plants which he has occasion to study than the husbandman can do to the multitude he is obliged to rear. The physician must learn to think, the husbandman to work. An analogy between the economy of animal and vegetable life could hardly fail to engage the attention of the physician, and would make him a botanist, both as a classifier of plants and as a philosopher.

He would naturally expect to unite the services of his drugs by combining them in his recipes, and would be surprised at his disappointments. Curious and unexpected changes would frequently occur in his manipulations: the sensible qualities, and even the external appearances of his simples, would be often changed, and even inverted by their mixture; and their medicinal properties would frequently vanish from the compound, and new ones be induced. These are curious, and to him interesting facts; and he would naturally be inquisitive after the principles which regulate these changes. His skill in this would by degrees extend beyond the immediate use for the knowledge; and the more curious speculatist would lay the foundations of a most extensive and important science, comprehending all the phenomena of heat and mixture.

Along with this, and springing from the same source, another science must arise, contemplating the appearances of animal and vegetable life, and founded on a careful observation and accurate description of the wonderful machine. The most incurious of men have in all ages been affected by the displays of wisdom and contrivance in the bodies of animals, and immediately engaged in investigation into the uses and functions of their various parts and organs. The phenomena have been gradually discriminated and arranged under the various heads of nutrition, concoction, secretion, absorption, assimilation, rejection, growth, life, decay, disease, and death; and, in conformity to the doctrines

which have with greater or less evidence been established on these subjects, the action of medicines, and the whole practice of physic and surgery, has been established in the form of a liberal or scientific art.

The husbandman in the mean time must labour the ground which lies before him. He, too, is greatly interested in the knowledge of the vegetable economy, and forms some systems on the subject by which he regulates his labours: but he sees, that whatever is the nature of vegetable life, he must work hard, and he searches about for every thing which can tend to diminish his labour. The properties of the lever, the wedge, and the inclined plane, soon become familiar to him; and without being able to tell on what their efficacy depends, he uses them with a certain sagacity and effect. The strength of timber, the pressure and force of water, are daily seen and employed by him and other artificers who labour for their mutual accommodation; and some rude principles on these subjects are committed to memory. Many tools and simple machines are by this time familiar; and thus the general properties of matter, and the general laws of the actions of bodies on each other, become gradually matter of observation and reflection; and the practical mechanic will be frequently improving his tools and machines. The general aim is to produce a greater quantity of work by the same exertion. The attempts to improvement will be awkward, and frequently unsuccessful. When a man finds, that by increasing the length of his lever he increases his power of overcoming a resistance, a small degree of curiosity is sufficient to make him inquire in what proportion his advantage increases. When he finds that a double length gives him a double energy, he will be surprised and mortified to find, that at the end of the day he has not performed twice the quantity of work: but, after much experience, he will learn that every increase of energy, by means of a machine, is nearly compensated by an increase of time in the performance of his task; and thus one of the great and leading principles of practical mechanics was inculcated in a manner not to be forgotten, and the practical mechanic was brought to speculate about motion and force, and by gradual and easy steps the general laws of simple motions were established.

It is evident that these speculations cannot be carried on, nor any considerable knowledge acquired, without some acquaintance with the art of measurement: and the very questions which the mechanic wishes to solve, presuppose some advances in this art, which in process of time refined itself into mathematics, the most perfect of all the sciences. All the phenomena of sensible motion afford employment to the mathematician. It is performed in a double or triple time, through a double or triple space, by a double or triple body, by the exertion of a double or triple force, produces a double or triple effect, is more to the right or to the left, upwards or downwards, &c. In short, every affection of motion is an object of mathematical discussion. Such a science must have appeared ere now in the form of an art, in consequence of the mutual transactions of men. These among an uncultivated people are chiefly in the way of barter. If I want corn from a peasant, and have nothing to give for it but the cloth which I have made, we must fall on some way

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of the me-
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The origin
of mathe-
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way of adjusting our terms in respect of the quantity. We should soon discover that the length, and breadth, and depth, of the box or bag, were equally important; and it was not difficult to see, that if any of them were doubled or tripled, the quantity of grain would be so too; if two of them were doubled, the grain would be quadrupled; and if all the three were doubled the quantity of grain would be increased eight times: the same thing would be observed with respect to my cloth. By such transactions as these, a few of the properties of plane and solid numbers and figures would become known, and the operations of multiplication and division, where arithmetic is combined with geometry: and daily observation shows us, that the more abstruse properties of number and figure, which to the generality of mankind are so insignificant, lay hold on the fancy of some individuals with such force, as to abstract them from every other intellectual entertainment, and are studied with a keenness and perseverance almost unequalled in any other walk of science. To most men the performance of a machine is a more attractive object than the properties of a figure, and the property of a figure more entertaining than that of a number; but the fact seems to have been otherwise. Before Pythagoras had invented the theorem that bears his name (see PHILOSOPHY, n° 15. and note H.), and which is among the first elements of geometry, he had reformed the Grecian music by the addition of a note to their scale, and this addition proceeds on a very refined speculation on the properties of numbers; so that among the Greeks arithmetic must have made considerable progress, while geometry was yet in its cradle: and we know to what astonishing length they prosecuted the science of pure geometry, while their knowledge of mechanical principles was almost nothing. Also the Arabs hardly made any addition to the geometry of the Greeks, if they did not rather almost completely forget it; whilst they improved their arithmetic into algebra, the most refined and abstracted branch of human knowledge. There is such a distance, in point of simplicity, between pure mathematics and the most elementary mechanics, that the former continued to make rapid steps to improvement in more modern times, while the latter languished in its infancy, and hardly deserved the name of science till very lately, when the great demand for it, by the increase and improvement in manufactures, both interested many in the study, and facilitated its progress, by the multitude of machines which were contriving on all hands by the manufacturers and artisans: and even at present it must be acknowledged, that it is to them that we are indebted for almost every new invention in mechanics, and that the speculatist seldom has done more than improve the invention, by exhibiting its principles, and thus enabling the artist to correct its imperfections; and now science and art go hand in hand, mutually giving and receiving assistance. The demands of the navigator for mathematical and astronomical knowledge have dignified these sciences; and they are no longer the means of elegant amusement alone, but merit the munificence of princes, who have erected observatories, and furnished voyages of discovery, where the mathematical sciences are at the same time cherished and applied to the most important purposes.

This short sketch of what may be called *the natural*

history of physical sciences will not, we hope, be thought improper or unprofitable. It tends to confirm an assertion often alluded to, that the prosecution of the study of nature will be more successful, if we imitate her mode of proceeding, and divide the labour. It will be still further confirmed by attending to the scientific difference of the phenomena, which marks out a different mode of proceeding, and a difference in the knowledge which we shall ultimately acquire, after our most successful researches.

In both classes of phenomena already distinguished (n° 6.) we must grant, that the principle which connects the pairs of concomitant events, rendering the one the inseparable companion of the other, is totally unknown to us, because it is not the immediate object of our perception.

But in the phenomena of the first class, we see the immediate exertion of this principle, whatever it may be; we can observe the exertion with accuracy; we can determine its kind and degree, which are the signs and measures of the kind and degree of the unperceived cause. This exertion, being always some modification of motion, allows us to call in the aid of mathematical knowledge, and thus to ascertain with the precision peculiar to that science the energy of the cause, judging of the tendency and quantity by the tendency and the quantity of the observed effect.

But in the second class of phenomena the case is very different. In the operations of chemistry, for instance, the immediate exertion of the cause is not perceived: all that we observe is the assemblage of particles which obtains before mixture, and that which takes place when it is completed, and which we consider as its result. The procedure of nature in producing the change is unseen and unknown. The steps are hid from our observation. We are not only ignorant of the cause which determines one particle of our food to become a part of our body while others are rejected, but we do not see the operation. We are not only ignorant of the cause which determines a particle of vitriolic acid to quit the fossil alkali with which it is united in Glauber salt, and to attach itself to a particle of magnesia already united with the muriatic acid, which also quits it to unite with the alkali, but we do not see the operation. The particles and their motions are not the objects of our senses; and all that we see is the Epsom salt and common salt separated from the water in which we had formerly dissolved the sal mirabile and the muriated magnesia. The motions, which are the immediate effects of the changing causes, and therefore their only indications, characteristics, and measures, fitted to show their nature, are hid from our view.

Our knowledge therefore of these phenomena must be less perfect than that of the phenomena of the former class; and we must here content ourselves with the discovery of more remote relations and remote causes, and with our ignorance of the very powers of nature by which these changes are brought about, and which are cognoscible only by their immediate effects, viz. the motions which they produce unseen. The knowledge which we do really acquire is somewhat similar to what the mechanical philosopher has acquired when he has discovered, by many experiments and investigations, that magnets attract each other by their dissimilar

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milar poles, and repel each other by their similar poles, and do not act at all on any bodies but loadstones and iron. Here we leave undiscovered all that is most curious in the phenomenon, *viz.* how these attractions and repulsions are produced; and even here the magnetical philosopher has the advantage of seeing the agents and the operation.

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Though
some philo-
sophers
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tempted
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motion;

But philosophers attending to this circumstance, that, even in these cases, the changes are produced by motions, or consist in motions, however unperceived these may be, have concluded, that the laws according to which nature operates in producing these changes are similar to the laws which regulate her operations in the sensible actions of bodies, or are included in them; and that the motions, though unseen, and the moving forces, are perfectly similar. They have therefore employed similar modes of investigation, applying the laws of impulse, and calling in the aid of mathematical knowledge.

Of this we have many examples in the writings of Dr Freind, Keil, Bernoulli, Helsham, Boerhaave, Hartley, and others, who have delivered theories of fermentation, solution, precipitation, crystallization, nutrition, secretion, muscular action, nay even of sensation and intelligence, founded, as they think, on the laws of motion, and illustrated and supported by mathematical reasoning. Lord Bacon himself, that careful and sagacious distinguisher of intellectual operations, has gone into the same track in his explanation of the phenomena of fire and combustion: and Sir Isaac Newton has made several attempts of the same kind, although with peculiarities which always characterise his discussions, and make them very different from those of an inferior class.

45
But their
attempts
have been
unsuccess-
ful.

But the success of these philosophers has hitherto been very discouraging: indeed they had no title to expect any; for their whole trains of reasoning have proceeded on analogies which were not observed, but assumed or *supposed* without any authority. There is not that similarity in the phenomenon, or in the visible effect, which is absolutely necessary for a successful reasoning by analogy. We do not observe any local motion, any change of place, which alone enables us to reason mathematically on the subject. And to make the case desperate, this ill-founded analogy has been mixed with hypotheses completely gratuitous. Certain forms have been assigned to the particles, and certain modes of action have been laid down for them, for whose reality we have not the least argument or indication: and to complete the matter, these fancied forms and laws of action have been such as are either self contradictory and inconsistent, or they have been such as, if allowed to act in a way analogous to what we observe in the sensible motions of bodies, would produce effects totally different from those which are observed. These atomical theories, as they are called, transgress every rule of philosophical discussion, and even the best of them are little better than trifling amusements. By far the greatest part of them only serve to raise a smile of pity and contempt in every person at all acquainted with mechanical philosophy. Whenever we see an author attempting to explain these hidden operations of nature by invisible fluids, by æthers, by collisions, and vibrations, and particularly if we see him introducing ma-

thematical reasonings into such explanations—the best thing we can do is to shut the book, and take to some other subject. That we may not be thought to speak presumptuously on this occasion, we only beg leave to remind our readers, that the united knowledge of the most eminent mathematicians of Europe has not yet been able to give any thing more than an approximation to the solution of the problem of three bodies; that is, to determine with accuracy the motions of three particles of matter acting on each other in the simplest of all possible manners, *viz.* by forces varying as the squares of the distances inversely: and the vibrations of elastic bodies, of any but the very simplest possible forms, are to this day beyond the reach of investigation. What then should be our expectations in cases where millions of particles are acting at once, of forms unobserved, and with forces unknown, and where the object is not a determination of an average result of many, where the precise state of an individual particle need not be known, but where it is this very precise state of each single particle that we want to know? What can it be but uncertainty and mistake?

Notwithstanding these discouraging circumstances, 46
we must observe that this kind of inquiry has greatly The advan-
improved of late years, along with the improvement tage de-
and extension of mathematical philosophy, and since rived in
philosophers have given over their incessant attempts to these spe-
explain every thing by impulse; and we need not de- culations
spair of making still farther advances, if we will con- from ma-
tent ourselves with going no farther than Newton has thematical
done in his explanation of the planetary motions. He philosophy.
has immortalized his own name, and has added im-
mensely to our stock of useful knowledge: yet he has
stopped short at the discovery of the fact of universal
gravitation; and all who have endeavoured to explain
or account for this fact have only exposed themselves
to pity. We may perhaps be one day able to demon-
strate from the phenomena, that the particles of mat-
ter have certain mutual tendencies to or from each
other, exerted according to fixed or invaried rules;
and from these tendencies we may be able to explain
many other phenomena, and predict the consequences,
with as much certainty and evidence as an astronomer
calculates a future eclipse. This would be a great ac-
quisition, and perhaps more is impossible: and the road
to this has been hinted by Sir Isaac Newton, who has
expressed his suspicion, that as the great movements of
the solar system are regulated by universal gravitation,
so the mutual actions of the particles of matter are
produced and regulated by tendencies of a similar kind,
equally but not *more* inexplicable, and of which the
laws of action are to be discovered by as careful an at-
tention to the phenomena, and by the same patient
thinking, which he has employed on the planetary mo-
tions. And a beautiful introduction to this new and
almost unbounded field of enquiry has been given us
by the celebrated Abbé Boscovich, in his Theory of
Natural Philosophy, where he has shown how such mu-
tual tendencies, similar in every ultimate particle of
matter, and modified by conditions that are highly
probable, nay almost demonstrable, will not only pro-
duce the sensible forms of solidity, hardness, elasticity,
ductility, fluidity, and vapour, under an inconceivable
variety

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variety of subordinate appearances, and the observed laws of sensible motion, but will go far to explain the phenomena of fusion, congelation, solution, crystallization, &c. &c. &c. both in chemistry and physiology. We earnestly recommend this work to the perusal of all who wish to obtain a distinct notion of the internal constitution of natural bodies, and of the way in which the uniting forces produce their ultimate and sensible effects. Any person, possessed of a moderate share of mathematical knowledge, will be convinced that the process of nature is not very different from what he describes; and that much of what we observe must happen as he says, even although the ultimate atoms of matter are not inextended mathematical points, accompanied with attracting and repelling forces.

47
Our ignorance will
great, and the proba-
ble increase
of know-
ledge among po-
sterity.

But we have many steps to make before we begin this study: Nature opens to us an immense volume; and we doubt not that our posterity will long find employment in the perusal, even though advancing with the celerity and success of the last century. We have not yet arrived at the threshold in many parts of this research: In many parts of chemistry, for instance, we are as yet uncertain with respect to the phenomena themselves, which are to be the subjects of this discussion. The composition of bodies must be fully understood before we begin to speak of the forces which unite their particles, or speculate about their modes of action. As long as water was considered as an element, we were ignorant of the forces inherent in its particles; we are perhaps still ignorant of this; but we now know that they are extremely different from what we formerly supposed them to be. It is but in a very few, if in any, cases of chemical combination, that we even know what are the ingredients: till we know this, it is too soon to speculate about their mode of union. Our ignorance in the real events in the animal and vegetable economy is still greater. Our first task therefore is to proceed, as we are now doing, in the accurate examination and classification of the phenomena themselves; and, without attempting to bring them within the pale of mathematical philosophy, by attempting what are called mechanical explanations, let us give up the consideration of these hidden operations, and augment to the utmost our list of secondary laws of visible but remote connections. All the mechanical speculations of the honourable Robert Boyle about the sensible qualities of things are now forgotten; but his chemical experiments preserve all their value, and are frequently referred to. The same may be said of the sagacious Dr Hales, whose fanciful notions of internal conflicts, and collisions, and vibrations, derogate nothing from the value of the curious facts which he has established both in the animal and vegetable economy.

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The particu-
lar divi-
sions of
physical
science in
Britain.

This distinction in the nature of the phenomena, and this difference in the nature of the knowledge which is to be acquired, and the means which are to be employed for the successful prosecution of these two branches of general physics, has occasioned a still farther restriction (at least in Britain) of the term NATURAL PHILOSOPHY. It is particularly applied to the study of the phenomena of the first class, while those of the second have produced the sciences of CHEMISTRY and PHYSIOLOGY.

Natural philosophy and chemistry have generally been made particular institutions in our seminaries of learning, but physiology has more commonly been taught in conjunction with anatomy, medicine, and botany.

The phenomena of the first class have been usually called MECHANICAL, in order to distinguish them from those observed in the operations of chemistry, and in the animal and vegetable economy; and the explanations which have been attempted of some of the last, by applying the laws observed in the phenomena of the first class, have been called *mechanical explanations*.

As this first class is evidently but a part of general physics, there is some impropriety in giving the name *natural philosophy* to a course of doctrines which is confined to these alone. Indeed at the first institution of universities, the lectures given in the *Schola Physica* were much more extensive, comprehending almost all the phenomena of the material world: but as all arts and sciences have improved most where the labour has been most divided, it was found more conducive to the advancement of knowledge that separate institutions should be founded for the studies of natural history, chemistry, physiology, &c.; and thus the phenomena, purely mechanical, and a few others in magnetism, electricity, and optics, which either were susceptible of mathematical treatment, or had little connection with the studies of chemistry and physiology, were left to the care of the professor of natural philosophy.

As the terms *chemistry* and *physiology* have been applied to two very important branches of general physics, we think that a more specific or characteristic name might be appropriated to the other, and that it might very properly be termed MECHANICAL PHILOSOPHY.

It only remains to make a few observations on the distinctive means of prosecuting these studies with success, and to point out some of the advantages which may reasonably be expected from a careful prosecution of them: and as the second branch has been fully treated under the several articles of CHEMISTRY, PHYSIOLOGY, &c. we shall confine ourselves to what is usually called NATURAL PHILOSOPHY.

MECHANICAL PHILOSOPHY may, in conformity with the foregoing observations, be defined, "the study of the sensible motions of the bodies of the universe, and of their actions producing sensible motions, with the view to discover their causes, to explain subordinate phenomena, and to improve art." 49
Mechanical
philosophy
defined,
and its
principles
explained.

The principle upon which all philosophical discussion proceeds is, that every change which we observe in the condition of things is considered by us as an effect, indicating the agency, characterising the kind, and measuring the degree, of its cause.

In the language of mechanical philosophy, the cause of any change of motion is called a moving or changing FORCE.

The disquisitions of natural philosophy must therefore begin with the consideration of motion, carefully noticing every affection or quality of it, so as to establish marks and measures of every change of which it is susceptible; for these are the only marks and measures

Mechanical Philosophy. 50 The laws of motion and their application. fures of the changing forces. This being done, it only remains to apply them to the motions which we observe in the universe.

From the general principle of philosophical discussion already mentioned, there flow directly two axioms.

1. Every body perseveres in a state of rest or of uniform rectilinear motion, unless affected by some moving force.

2. Every change of motion is in the direction and in the degree of the force impressed.

These are usually called the LAWS OF MOTION. They are more properly laws of human judgment, with respect to motion. Perhaps they are necessary truths, unless it be alleged that the general principle, of which they are necessary consequences, is itself a contingent though universal truth.

By these two axioms, applied in *abstracto* to every variety of motion, we establish a system of general doctrines concerning motions, according as they are simple or compounded, accelerated, retarded, rectilinear, curvilinear, in single bodies, or in systems of connected bodies; and we obtain corresponding characteristics and measures of accelerating or retarding forces, centripetal or centrifugal, simple or compound.

We have an illustrious example of this abstract system of motion and moving forces in the first book of Sir Isaac Newton's *Mathematical Principles of Natural Philosophy*. Euler's *Mechanica sive Scientia Motus*, Herman's *Phoronomia sive de Viribus Corporum*, and D'Alembert's *Traité de Dynamique*, are also excellent works of the same kind. In this abstract system no regard is paid to the casual differences of moving forces, or the sources from which they arise. It is enough to characterise a double accelerating force, for instance, that it produces a double acceleration. It may be a weight, a stream of water, the pressure of a man; and the force, of which it is said to be double, may be the attraction of a magnet, a current of air, or the action of a spring.

Having established these general doctrines, the philosopher now applies them to the general phenomena of the universe, in order to discover the nature of the forces which really exist, and the laws by which their operations are regulated, and to explain interesting but subordinate phenomena. This is the chief business of the mechanical philosopher; and it may with some propriety be called *the mechanical history of nature*.

51 Of the arrangement of the mechanical phenomena of the universe. Some method must be followed in this history of mechanical nature. The phenomena must be classed by means of their resemblances, which infer a resemblance in their causes, and these classes must be arranged according to some principle. We have seen no method which appears to us less exceptionable than the following.

52 The generality of the phenomena is the principle of arrangement. The principle of arrangement is the generality of the phenomena; and the propriety of adopting this principle, arises from the probability which it gives us of more readily discovering the most general actuating forces, whose agency is implicated in all other phenomena of less extent; and therefore should be previously discussed, that we may detect the discriminating circumstances which serve to characterise the subordinate

phenomena, and are thus the marks of the distinguishing and inferior natural powers.

The most general of all phenomena is the curvilinear motion of bodies in free space; it is observed through the whole extent of the solar system.

The mechanical history of nature begins therefore with astronomy. Here, from the general phenomena of the planetary motions, is evinced the fact of the mutual deflection of every body towards every other body, and this in the inverse proportion of the squares of the distance, and the direct proportion of the quantity of matter. This is the fact of UNIVERSAL GRAVITATION, indicating the agency, and measuring the intensity, of the universal force of mutual gravity.

Having established this as an universal fact, the natural philosopher proceeds to point out all the particular facts which are comprehended under it, and whose peculiarities characterise the different movements of the solar system. That is, in the language of philosophy, he gives a theory or explanation of the subordinate phenomena; the elliptical motions of the planets and comets, their mutual disturbances; the lunar irregularities; the oblate figure of the planets; the nutation of the earth's axis; the precision of the equinoxes; and the phenomena of the tides and trade winds: and he concludes with the theory of the parabolic motion of bodies projected on the surface of this globe, and the motion of pendulums.

54 As he goes along, he takes notice of the applications which may be made to the arts of life of the various doctrines which are successively established; such as chronology, astronomical calculation, dialling, navigation, gunnery, and the measuring of time.

55 The nature of gravitation. If a square parcel of sand be lying on the table, and the finger be applied to any part of it to push it along the table, that part is removed where you will, but the rest remains in its place; but if it is a piece of sandstone of the same materials and shape, and the finger is applied as before, the whole is moved; the other parts accompany the part impelled by the finger in all its motions.

56 And of cohesion. From the moon's accompanying the earth in all its motions round the sun, we infer a moving force which connects the moon and earth. In like manner, we must conclude that a moving force connects the particles of the stone; for we give the name *force* to every thing which produces motion: We call it the force of COHESION; a term which, like gravitation, expresses merely a fact.

This seems to be the next phenomenon of the universe in point of extent.

57 Mode of investigating the laws of cohesion. Having, from the general phenomenon, established the existence of this force, the philosopher proceeds to ascertain the laws by which its exertions are regulated, which is the ascertaining its distinctive nature and properties. This he does in the same way that he ascertained the nature of planetary gravitation, viz. by observing more particularly the various phenomena.

Here is opened a most extensive and varied field of observation, in which it must be acknowledged that very little regular and marked progress has been made. The variety in the phenomena, and the consequent variety in the nature of the connecting forces, appear as yet inconceivably great; and there seems little probability

Mechanical Philosophy.

52 The laws of motion are first applied to astronomical phenomena.

54 The application of this science to the arts of life.

55 The nature of gravitation.

56 And of cohesion.

57 Mode of investigating the laws of cohesion.

Mechanical Philosophy. bability of our being able to detect in them all any sameness, combined with the other distinguishing circumstances, as we have done in the case of gravity. Yet we should not despair. Boscovich has shown, in the most unexceptionable manner, that although we shall suppose that every atom of matter is endued with a perfectly similar force, acting in a certain determined ratio of the small and imperceptible distances at which the particles of matter are arranged with respect to each other, the external or sensible appearances may, and must, have all that variety which we observe. He also shows very distinctly how, from the operation of this force, must arise some of the most general and important phenomena which characterise the different forms of tangible bodies.

We observe the chief varieties of the action of this CORPUSCULAR force on the bodies which we denominate *hard, soft, solid, fluid, vaporous, brittle, ductile, elastic*. We see instances where the parts of bodies avoid each other, and require external force to keep them together, or at certain small distances from each other. This is familiar in air, vapours, and all compressible and elastic bodies.

This is evidently a most curious and interesting subject of investigation. On the nature and action of these corpuscular forces depends the strength or firmness of solids, their elasticity, their power of communicating motion, the pressure, and motion, and impulse of fluids; nay, on the same actions depend all the chemical and physiological phenomena of expansion, fusion, congelation, vaporisation, condensation, solution, precipitation, absorption, secretion, fermentation, and animal and vegetable concoction and assimilation.

Out of this immense store of phenomena, this inexhaustible fund of employment for our powers of investigation, the natural philosopher selects those which lead directly to the production or modification of sensible motion.

He will therefore consider,

1. The communication of motion among detached and free bodies, establishing the laws of impulse or collision. This has always been considered as the elementary doctrine of mechanical philosophy, and as the most familiar fact observed in the material world; and in all ages philosophers have been anxious to reduce all actions of bodies on each other to impulse, and have never thought a phenomenon completely explained or accounted for till it has been shown to be a case of impulse. This it is which has given rise to the hypotheses of vortices, ethers, magnetic and electric fluids, animal spirits, and a multitude of fancied intermediums between the sensible masses of matter, which are said in common language to act on each other. A heavy body is supposed to fall, because it is impelled by a stream of an invisible fluid moving according to certain conditions suited to the case. The filings of iron are supposed to be arranged round a magnet, by means of a stream of magnetic fluid issuing from one pole, circulating perpetually round the magnet, and entering at the other pole, in the same manner as we observe the stote grafs arranged by the current of a brook.

But the philosopher who has begun the mechanical study of nature by the abstract doctrines of dynamics, and made its first application to the celestial phenomena, and who has attended carefully to the many ana-

logies between the phenomena of gravitation and cohesion, will be at least ready to entertain very different notions of this matter. He will be so far from thinking that the production of motion by impulse is the most familiar fact in nature, that he will acknowledge it to be comparatively very rare; nay, there are some appearances in the facts which are usually considered as instances of impulsion, which will lead him to doubt, and almost to deny, that there has ever been observed an instance of one body putting another in motion by coming into absolute contact with it, and striking it; and he will be disposed to think that the production of motion in this case is precisely similar to what we observe when we gently push one floating magnet towards another, with their similar poles fronting each other. There will be the same production of motion in the one and diminution of it in the other, and the same uniform motion of the common centre of gravity: and, in this case of the magnets, he sees completely the necessity of a law of motion, which is not an axiom, but is observed through the whole of nature, and which receives no explanation from any hypothesis of an intervening fluid, but is even totally inconsistent with them. We mean, "that every action of one body on another is accompanied by an equal and opposite action of that other on the first." This is usually called the *equality of action and reaction*: it is not intuitive, but it is universal; and it is a necessary consequence of the perfect similarity of the corpuscular forces of the same kinds of matter. This general fact, unaccountable on the hypothesis of impelling fluids, is considered in the planetary motions as the unequivocal indication of the sameness of that gravity which regulates them all. The rules of good reasoning should make us draw the same conclusion here, that the particles of tangible matter are connected by equal and mutual forces, which are the *immediate causes* of all their sensible actions, and that these forces, like gravitation, vary with every change of distance and situation.

The laws of collision and impulsion being now established, either as original facts or as consequences of the agency of equal and mutual forces which connect the particles of matter, the philosopher considers,

2. The production of motion by the intervention of solid bodies, where, by reason of the cohesion of matter, some of the motions are necessarily confined to certain determinate paths or directions. This is the case in all motions round fixed points or axes, or along planes or curves which are oblique to the action of the forces.

This part of the study contains the theory of machines, pointing out the principles on which their energy depends, and consequently furnishing maxims for their construction and improvement. But these observations do not complete the discussion of the mechanism of solid bodies: they are not only solid and inert, but they are also heavy; therefore the action of gravity must be combined with the consequences of solidity. This will lead to discussions about the centre of gravity, the theory and construction of arches and roofs, the principles of stability and equilibrium, the attitudes of animals, and many particulars of this kind.

3. The philosopher will now turn his attention to another form, in which tangible matter exhibits many interesting phenomena, *viz. FLUIDITY*. The first thing

Mechanical Philosophy.

Motion seems to be produced from the equality of action and reaction.

Of motion as it respects the theory of machines, &c.

62 Machines.

63 The nature and definition of fluidity.

58 The production of motion by impulse has been thought the most familiar fact in nature.

59 But this opinion is very questionable.

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Philosophy.

to be attended to here is, *What is that particular form of existence? What is the precise phenomenon which characterises fluidity? What is the definition of a fluid?* This is by no means an easy question, and considerable objections may be stated against any definition that has been given of it. Sir Isaac Newton says, that *a fluid is a body whose particles yield to the smallest impression, and by so yielding are easily moved among themselves.* It may be doubted whether this be sufficiently precise; what is meant by the *smallest impression?* and what is *easily moving?* Is there any precise degree of impression to which they do not yield; and do they oppose any resistance to motion? And a stronger objection may be made: It is not clear that a body so constituted will exhibit all the appearances which a body acknowledged to be fluid does really exhibit. Euler offers some very plausible reasons for doubting whether it will account for the horizontal surface, and the complete propagation of pressure through the fluid in every direction; and therefore prefers selecting *this last phenomenon*, the propagation of pressure *quæqua-versum*, as the characteristic of fluidity, because a body having this constitution (on whatever circumstances it may depend) will have every other observed property of a fluid. But this definition is hardly simple or perspicuous enough; and we think that the objections against Newton's more simple and intelligible definition are not unanswerable. Boscovich defines a fluid to be, *a body whose particles exert the same mutual forces in all directions*; and shows, that such particles must be indifferent, as to any position, with respect to each other. If no external force act on them, they will remain in every position, and will have no tendency to arrange themselves in one position rather than another; differing in this respect from the particles of solid, or soft, or viscid bodies; which require some force to change their respective positions, and which recover these positions again when but gently disturbed. He illustrates this distinction very beautifully, by comparing a parcel of balls thrown on quicksilver, and attracting each other, with a parcel of magnets in the same situation. The balls will stick together, but *in any position*; whereas the magnets will always affect a particular arrangement.

64
Of the pressure and equilibrium of fluids, or hydrostatics.

When the characteristic phenomenon of fluidity has been selected, the philosopher proceeds to combine this property with gravity, and establishes the doctrines of HYDROSTATICS, or of the pressure and equilibrium of heavy fluids, the propagation of this pressure in every direction; and demonstrates the horizontality of surface assumed by all perfect fluids.

These doctrines and principles enable us to determine several very interesting circumstances respecting the mutual pressure of solids and fluids on each other; the pressures exerted on the bottoms and sides of vessels; the support and whole mechanism of floating bodies, &c.

65
Of the motion of fluids, or hydraulics.

He then considers how fluids will move when their equilibrium of pressure is destroyed; and establishes the doctrines of HYDRAULICS, containing all the modifications of this motion, arising from the form of the vessels, or from the intensity or direction of the pressure which occasions it. And this subject is completed by the consideration of the resistance which fluids oppose to the motion of solid bodies through them, and their impulse on bodies opposed to their action.

These are very important matters, being the foundations of many mechanical arts, and furnishing us with some of our most convenient and efficacious powers for impelling machines. They are also of very difficult discussion, and are by no means completely investigated or established. Much remains yet to be done both for perfecting the theories and for improving the arts which depend on them.

It is evident, that on these doctrines depend the knowledge of the motions of rivers and of waves; the buoyancy, equilibrium, and stability of ships; the motion of ships through the waters; the action of the winds on the sails; and the whole arts of marine construction and seamanship.

There is another general form of tangible matter which exhibits very different phenomena, which are also extremely interesting; we mean that of VAPOUR. A vapour is a fluid; and all the vapours that we know are heavy fluids: they are therefore subject to all the laws of pressure and impulse, which have been considered under the articles HYDROSTATICS and HYDRAULICS. But they are susceptible of great compression by the action of external forces, and expand again when these forces are removed. In consequence of this compression and expansion, the general phenomena of fluidity receive great and important modifications; and this class of fluids requires a particular consideration. As air is a familiar instance, this branch of mechanical philosophy has been called PNEUMATICS.

Under this head we consider the pressure of the atmosphere, and its effects, both on solid and fluid bodies. It produces the rise of waters or other fluids in pumps and syphons, and gives us the theory of their construction: it explains many curious phenomena of nature, such as the motions in the atmosphere, and their connection with the pressure of the air, and its effect on the barometer or weather-glass. Air, when in motion, is called *wind*; and it may be employed to impel bodies. The theory of its action, and of its resistance to moving bodies, are therefore to be considered in this place.

But besides their motions of progression, &c. such as we observe in winds, compressible or elastic fluids are susceptible of what may be termed *internal motion*; a kind of undulation, where the contiguous parts are thrown into tremulous vibrations, in which they are alternately condensed and rarefied; and these undulations are propagated along the mass of elastic fluid, much in the same way in which we observe waves to spread on the surface of water. What makes this an interesting subject of consideration is, that these undulations are the more ordinary causes of sound. A trembling chord, or spring, or bell, agitates the air adjoining to it: these agitations are propagated along the air, and by its intervention agitate the organ of hearing. The mechanism of these undulations has been much studied, and furnishes a very beautiful theory of musical harmony.

The philosopher examines the *law of compressibility* of air and other elastic fluids; and thus gets the knowledge of the constitution of the atmosphere, and of the action of those fluids when employed to impel solid bodies. Gunpowder contains an immense quantity of permanently elastic air, which may be set at liberty by inflammation. When this is done at the bottom of a piece of ordnance, it will impel a ball along the barrel, and

Mechanical
Philosophy.
66
The importance and difficulty of these branches of science.

67
The nature and definition of vapour.

68
The doctrine of air, or pneumatics.

69
Of the compressibility of elastic fluids, and its consequences.

Mechanical and discharge it from the muzzle, in the same way that an arrow is impelled by a bow. And thus having discovered in what degree this air presses in proportion to its expansion, we discover its action on the ball through the whole length of the piece, and the velocity which it will finally communicate to it. Here then is contained a theory of artillery and of mines.

70 Of the conversion of bodies into elastic fluids by fire. Chemistry teaches us, that most bodies can be converted by fire into elastic fluids, which can be employed to act on other bodies in the way of pressure or impulse. Thus they come under the review of the mechanical philosopher; and they have become interesting by being employed as moving forces in some very powerful machines.

These discussions will nearly exhaust all the general mechanical phenomena. There remain some which are much more limited, but furnish very curious and important subjects of investigation.

71 Of the phenomena of loadstone, or magnetism. The phenomena exhibited between loadstones or magnets and iron have long attracted attention; and the use to which the polarity of the loadstone has been applied, namely, the directing the course of a ship through the pathless ocean, has rendered these phenomena extremely interesting. They are specified by the term MAGNETISM. Considerable progress has been made in the arrangement and generalization of them; but we have by no means been able hitherto to bring them all under one simple fact. The attention has been too much turned to the discovery of the ultimate cause of magnetism; whereas we should have rather employed our ingenuity in discovering all the general laws, in the same manner as Kepler and Newton did with respect to the celestial phenomena, without troubling themselves with the cause of gravitation. Dr Gilbert of Colchester was the first who considered the magnetical phenomena in the truly philosophical manner; and his treatise *De Magnete* may be considered as the first and one of the most perfect specimens of the Baconian or inductive logic. It is indeed an excellent performance; and when we consider its date, 1580, it is a wonder. *Æpinus's Tentamen Theoriæ Magnetismi* is a most valuable work, and contains all the knowledge which we have as yet of the subject.

72 Of electrical phenomena. There is another class of mechanical phenomena which have a considerable affinity with the magnetical; we mean the phenomena called ELECTRICAL. Certain bodies, when rubbed or otherwise treated, attract and repel other bodies, and occasion a great variety of sensible motions in the neighbouring bodies. Philosophers have paid much attention to these appearances of late years, and established many general laws concerning them. But we have not been more successful in bringing them all under one fact, and thus establishing a complete theory of them, than in the case of magnetism. Franklin and *Æpinus* are the authors who have been most successful in this respect. Dr Franklin in particular has acquired great celebrity by his most sagacious comparison of the phenomena; which has enabled him to establish a few general laws, almost as precise as those of Kepler, and of equally extensive influence. His discovery too of the identity of thunder and electricity has given an importance and dignity to the whole subject.

73 These are not all mechanical. There are many phenomena of electricity which cannot be called mechanical, and are of the most cu-

rious and interesting kind. As these have little connection with any of the other great branches of physical science, they have generally been considered in treatises of natural philosophy; and along with inquiries into the original cause of electricity in general, continue to engage much of our attention.

The appearances which are presented to us by our sense of seeing form another class, which have always been considered as making a branch of natural philosophy in all seminaries of learning. It does not, however, obviously appear, that they are mechanical phenomena. The intimate nature of light is still a secret. Fortunately it is not necessary to be known to give us a very perfect theory of the chief phenomena. The general laws of optics are so few, so simple, and so precise, that our theories are perhaps more perfect here than in any other branch of physics; but these theories are as yet far removed from the rank of primary facts. Many unknown events happen before the phenomenon comes under the hands of the ordinary optician, so as to become the subjects of the simple laws of reflection and refraction. It may even be doubted, and has been doubted, whether the phenomena of optics are cases of body in motion; whether all the lines which the optician draws are any thing but the directions along which certain *qualities* are exerted. The side of a ball which is next the candle may be bright and the other side dark, just as the side of a ball which is next the electrical globe is *minus* and the other side *plus*; and all this without any intervening medium. Apparition or visibility may be a quality of a body, depending on the proximity and position of another body, without any thing between them, just as weight is; and this quality may be cognizable by our faculty of seeing alone, just as the pressure of a heavy body is by our feeling alone.

76 The first thing which made it probable that mechanical philosophy had any thing to do with the phenomena of optics, was the discovery of Mr Roemer, "that apparition was not instantaneous;" that some time elapsed between the illumination of a body and its being seen at a distance. He discovered, that it was not till 40 minutes after the sun illuminated one of Jupiter's satellites that it was seen by an inhabitant of this globe. If therefore a sun were just created, it would be 40 minutes before Jupiter would be illuminated by him, and 200 before the Georgian planet would be illuminated. Here then is motion. It is therefore highly probable that there is something moved; but it is still doubted whether this something, which we call LIGHT, is a matter emitted from the shining body, and moving with great velocity, and acting on and affected by other bodies, in the various phenomena of optics; or whether it is a *certain state* of a medium which is thus propagated, as we see that waves are propagated along the surface of water, or sonorous undulations through the mass of air, while the water or air itself is hardly moved out of its place. Either of these suppositions makes optics a legitimate branch of mechanical philosophy; and it is the philosopher's business to examine both by the received laws of motion, and see which of them gives consequences which tally with the phenomena. This has been done; and we imagine that a complete incompatibility has been demonstrated between the consequences of the undula-

74 Of the phenomena of vision.

75 It has been doubted whether light is corporeal.

76 How optics came to be considered as a part of mechanical philosophy.

77 The nature of light is still undetermined.

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Philosophy.

dulations of an elastic medium, and the phenomena of optics; while the consequences of the other or vulgar notion on this subject are perfectly consistent with mechanical laws. There are some things in this hypothesis very far beyond our power to conceive distinctly; but they are all similar in this respect to many facts acknowledged by all; and there is no phenomenon that is inconsistent with the legitimate consequences of the hypothesis. This gives it great probability; and this probability is confirmed by many chemical facts, and by facts in the vegetable œconomy, which give strong and almost undeniable indications of light being a body capable of a chemical union with the other ingredients of sublunary bodies, and of being afterwards set at liberty under its own form, as the cause or medium of vision.

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But this
does not af-
fect the
science of
optics.

But these are questions similar to those about the cause of gravity, and totally unnecessary for establishing a complete theory of the optical phenomena, for explaining the nature of vision, the effects of optical instruments, the cause of colours, the phenomena of the rainbow, halos and periheliums, &c. &c. &c. Only all this theory is unconnected with the principles called mechanical.

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The pro-
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extensive
field of ob-
servation.

Such is the field of observation to the mechanical philosopher of the present day. We may hope to extend it, and by degrees apply its doctrines even to the unseen motions which take place in chemistry and physiology. But we must, in the first place, perfect our knowledge and description of the sensible motions and actions of bodies. Those of fluids still demand much investigation; and till these are thoroughly understood, it is not time to attempt penetrating further into the recesses of nature.

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Investiga-
tion of the
law that
action is
always
equal and
opposite to
reaction.

In the prosecution of this study, it is found that every change which can be observed in the state of a body, with respect to motion by the action of another body, is accompanied by an equal and opposite change in the state of that other body. Thus, in the phenomena of gravitation, it is observed that the deflections of the sun and planets are mutual. The same thing is observed in the actions of magnets on each other and on iron; it is also observed in the attractions and repulsions of electrical bodies; and it also obtains in all the phenomena of impulse and of corporeal pressure. It is therefore an universal law of motion, that *action is always equal and opposite to reaction*: but this must be considered merely as a matter of fact, a contingent law of nature, like that of gravitation. The contrary is perfectly conceivable, and involves no contradiction. That this is so, is evident from the proceedings of philosophers, who in every new case make it their business to discover by experiment whether this law was observed or not. It was among the last discoveries made by Sir Isaac Newton in his examination of the celestial motions. This being the case, it should never be assumed as a principle of reasoning till its operation has been ascertained by observation. It has been owing to this improper procedure that much false reasoning has been introduced into mechanical philosophy, and particularly into the theory of impulsion or the communication of motion by impulse. In considering this subject, a term has been introduced which has occasioned much wrangling and misconception; we mean the term INERTIA. It serves indeed to abbreviate language, but it has often misled the judge-

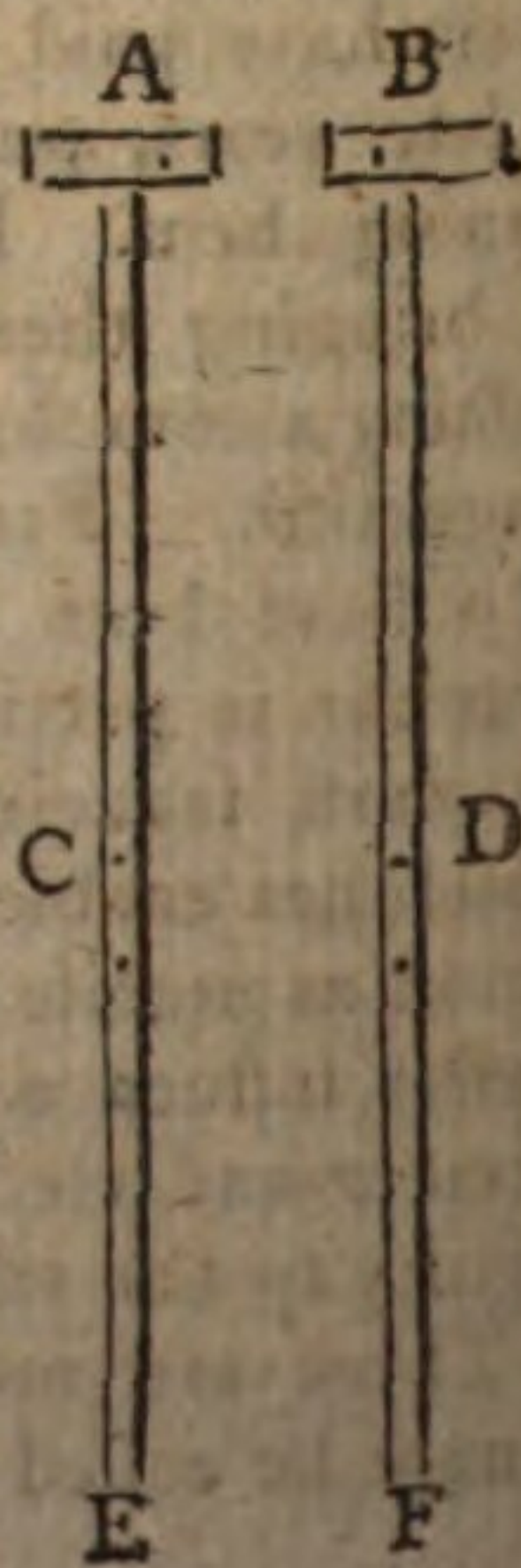
81
The term
inertia has
occasioned
much
wrangling
and miscon-
ception on
this sub-
ject.

ment. When used with cautious attention to every circumstance, it expresses nothing but the necessity of Philosophy. a cause to the production of any effect: but it is generally used as expressing a quality inherent in matter, by which it *resists* any change of state, or by which it maintains its present state. Matter is said to be inert; and as every thing which changes the motion of a body is called a *force*, and as this inertia of A is supposed to change the motion of B, it is called *vis inertia*; and yet matter is said to be indifferent as to motion or rest, and to be inactive. These are surely very incongruous expressions. This obscure discourse has arisen from the poverty of all languages, which are deficient in original terms, and therefore employ figurative ones. Force, action, resistance, are all appropriated terms related to our own exertions; and some resemblance between the external effects of these exertions and the effects of the connecting qualities of natural bodies, has made us use them in our disquisitions on these subjects. And as we are conscious that, in order to prevent our being pushed by another from our place, we must resist, exerting force; and that our resistance is the reason why this other man has not accomplished his purpose, we say, that the quiescent body resists being put in motion, and that its inertia is discovered by the diminution made in the motion of the impelling body: and upon the authority of this *vis inertia* as a first principle, the phenomena of impulsion are explained, and the law of equal action and reaction is established.

But all this procedure is in contradiction to the rules of inductive logic; and the obscurity and confusion which has arisen from this original misconception, the consequent incongruity of language, and the awkward attempts that have been made to botch and accommodate it to the real state of things, have occasioned a dispute, and the only dispute, in natural philosophy which has not yet been settled, and never can be settled, while such misconceptions are allowed to remain.

If the word *inertia* be taken as expressing, not a quality of matter, but a law of human judgment respecting matter, as expressing our necessity of inferring the agency of a moving force whenever we observe a change of motion, all difficulties will vanish, and the equality of action and reaction will be inferred, as it should be, from the phenomena of collision. There will be inferred a *vis insua corpori impellenti*, not *quâ moventi*, but *quâ corpori*; and this inference will carry us through all the mysteries of corporeal action, as it conducted Sir Isaac Newton in his grand researches.

Let us just consider how we reason in a new case. Let A and B be two magnets fastened on the ends of two long wooden laths AE, BF, which turn horizontally on pivots C, D, like compass needles, with their north poles fronting each other, 12 inches apart; and let A be pushed towards B, so that it would move uniformly with the velocity of two inches in a second. The phenomena which have been observed are as follows: A will gradually diminish its velocity; and when it has advanced about nine inches, will stop completely. B, in the mean time, will gradually acquire motion; and



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Its proper
meaning,
with an ex-
ample.

Mechanical Philosophy when it has advanced about nine inches, will have a velocity of about two inches per second, with which it will continue to move uniformly. Now what is inferred from these phenomena? Because the motion of A is gradually retarded, we infer that a retarding force, that is, a force in the direction BA has acted on it. And since this would not have happened if B had not been there, and always happens when B is there, we infer that B is either its cause or the occasion of its action. The vulgar say that B repels A; so say the dynamists. The abettors of invisible fluids say, that a stream of fluid issuing from B impels A in the opposite direction. All naturalists agree in saying, that an active force connected with B has destroyed the motion of A, and consider this curious phenomenon as the indication and characteristic of a discovery. The same inference is made from the motion produced in B: it is considered by all as effected by a force exerted or occasioned by the presence of A; and the dynamists and the vulgar say that A repels B. And both parties conclude, from the equal changes made on both bodies, that the changing forces are equal: here acknowledging, that they observe an equality of action and reaction; and they add this to the other instances of the extent of this law of motion.

All this while no one thinks of the inertia or inactivity of B, but, on the contrary, conclude this to be a curious instance of its activity; and most people conclude that both bodies carry about with them a *vis insita* both when at rest and when in motion.

83 It is doubtful whether actual contact has ever been observed. If other phenomena give unquestionable evidence that, in ordinary collisions, there is the same change of motion, produced without mathematical contact, the same inferences must be drawn; and a scrupulous naturalist will doubt whether contact should make any change in our reasonings on the subject, and whether actual contact ever has been or can be observed. He will also be convinced, that while this is the general, or perhaps universal, process of nature in producing motion by impulse, all explanations of the action of bodies *e distant*, by the intervention of ethers and other invisible fluids, are nothing but multiplying the difficulties; for in place of one fact, the approach of one magnet (for instance) to another, they substitute millions of unseen impulses, each of which equally needs an explanation. And if this fluid be supposed to produce its effects by any peculiarity in its constitution, as in the case of Newton's elastic ether proposed by him to explain gravitation, the hypothesis substitutes, in the most unqualified manner, millions of similar phenomena for the one to be explained; for there is the same want of a second fluid in order to produce that mutual recess of the particles of the ether which constitutes its elasticity.

84 The folly of supposing intervening ethers, &c. And this seems to be the limit to our inquiries into all the classes of natural phenomena. We find the masses or the particles of matter endued in fact with qualities which affect the state of other particles or masses, at smaller or at greater distances from each other according to certain general rules or laws. This ultimate step in the constitution of things is inscrutable by us. It is arrogance in the highest degree for us to say, that because we do not comprehend how there is inherent in a body any quality by which another body may be affected at any distance from it,

therefore no such quality is possible. It is no less so to say, that matter has no active property but that of moving other matter by impulse; and that because it may be so moved, and also by the agency of our own minds, therefore, when it is not moved by impulse, it is moved by minds. The same almighty FIAT which brought a particle of matter into existence could bring those qualities equally into existence; and the *how* in both is equally beyond our comprehension.

86 But, on the other hand, we must guard against the incurious resting on this consideration as a stop to further inquiry. There may be species of matter possessed of the mechanical powers, and which notwithstanding is not cognisable by our senses. All the properties of matter are not known to a person who is both deaf and blind; and beings possessed of more senses may perceive matter where we do not; and many phenomena may really be produced by the action of intervening matter, which we, from indolence or from haste, ascribe to the agency of inherent forces. The industry of philosophers has already discovered intermedia in some cases. It is now certain that air is the conveyer of sound, and it is almost certain that there is such a thing as light. Let us therefore indulge conjectures of this kind, and examine the conjectures by the received laws of motion, and reject them when we find the smallest inconsistency; and always keep in mind that even the most coincident with the phenomena is still but a possibility.

87 We may conclude the whole of these observations with the remark, that these questions about the activity or inactivity of matter are not physical, but metaphysical. Natural philosophy, it is true, commonly takes it for granted that matter is wholly inactive; but it is not of any moment in physics whether this opinion is true or false; whether matter is acted on according to certain laws, or whether it acts of itself according to the same laws, makes no difference to the natural philosopher. It is his business to discover the laws which really obtain, and to apply these to the solution of subordinate phenomena: but whether these laws arise from the nature of some agent external to matter, or whether matter itself is the agent, are questions which may be above his comprehension, and do not immediately concern his proper business.

88 The account we have now given of natural philosophy points out to us in the plainest manner the way in which the study must be prosecuted, and the helps which must be taken from other branches of human knowledge. The above account points out the best method of study.

89 The causes, powers, forces, or by whatever name we choose to express them, which produce the mechanical phenomena of the universe, are not observed, and are known to us only in the phenomena themselves. Our knowledge of the mechanical powers of nature must therefore keep pace with our knowledge of the motions, and indeed is nothing different from it. In order to discover and determine the forces by which the moon is retained in her orbit round the earth, we must know her motions. To a terrestrial spectator she appears to describe an ellipse, having the earth in one focus; but, in the mean time, the earth is carried round the sun, and the moon's real path, in absolute space, is a much more complicated figure. Till we know this figure, and the variations in the velocity with

Mechanical Philosophy with which it is described, we know nothing of the forces which actuate the moon in her orbit.

⁹⁰ When Newton says that the forces by which she is retained in this elliptical orbit are directed to the earth, what does he mean? Only this, that the deflection from that uniform rectilinear motion which she would otherwise have performed are always in this direction. In like manner, when he says that these forces are inversely proportionate to the squares of her distances from the earth, he only means that the deflections made in equal times in different parts of her motion are in this proportion. These deflections are considered as the characteristics and measures of the forces. We imagine that we have made all plain when we call this indicated cause a *tendency* to the earth; but we have no notion of this tendency to the earth different from the approach itself. This word tendency, so fashionable among the followers of Sir Isaac Newton, is perverted from its pure and original sense. *Tendere versus solem*, is, in the language of Rome, and also of Newton, *to go towards the sun*; but we now use the words *tend*, *tendency*, to signify, not the *approach*, but the *cause* of this approach. And when called upon to speak still plainer, we desert the safe paths of plain language, and we express ourselves by metaphor; speaking of *impetus*, *conatus sese mutuo accedende*, *vis centripeta*, &c. When these expressions have become familiar, the original sense of the word is forgotten, and we take it for granted that the words never had another meaning; and this metaphor, sprung from the poverty of language, becomes a fruitful source of misconception and mistake. The only way to secure ourselves against such mystical notions as are introduced by these means into philosophy, is to have recourse to the way in which we acquire the knowledge of these fancied powers; and then we see that their names are only names for phenomena, and that universal gravitation is only an universal mutual approach among the parts of the solar system.

⁹¹ There is one case in which we fondly imagine that we know the cause independent of the effect, and that we could have predicted the phenomenon *a priori*; we mean the case of impulse: and hence it is that we are so prone to reduce every thing to cases of impulsion, and that we have fallen upon all these subtleties of ethers and other subtle fluids. But we might have saved ourselves all this trouble; for after having, by much false reasoning and gratuitous assumptions, shown that the phenomenon in question *might have been produced* by impulse, we are no nearer our purpose, because that property by which matter in motion puts other matter in motion, is known to us only *by and in* the effect.

⁹² The fair and logical deduction from all this is, that we must not expect any knowledge of the powers of nature, the immediate causes of the motions of bodies, but by means of a knowledge of the motions themselves; and that every mistake in the motions is accompanied by a similar mistake in the causes. It is impossible to demonstrate or explain the gravitation of the planets to him who is ignorant of the properties of the ellipse, or the theory of gunnery to him who does not know the parabola.

A notion has of late gained ground, that a man may become a natural philosopher without mathema-

tical knowledge; but this is entertained by none who have any mathematics themselves; and surely those who are ignorant of mathematics should not be sustained as judges in this matter. We need only appeal to fact. It is only in those parts of natural philosophy which have been mathematically treated, that the investigations have been carried on with certainty, success, and utility. Without this guide, we must expect nothing but a school-boy's knowledge, resembling that of the man who takes up his religious creed on the authority of his priest, and can neither give a reason for what he imagines that he believes, nor apply it with confidence to any valuable purpose in life. We may read and be amused with the trifling or vague writings of a Nollet, a Ferguson, or a Priestley; but we shall not understand, nor profit by the truths communicated by a Newton, a D'Alembert, or De la Grange.

These observations, on the other hand, show us the nature of the knowledge which may be acquired, and the rank which natural philosophy holds among the sciences.

Motions are the real and only objects of our observation, the only subjects of our discussion. In motion is included no ideas but those of space and time, the subjects of pure mathematical disquisition. As soon, therefore, as we have discovered the fact, the motion, all our future reasonings about this motion are purely mathematical, depending only on the affections of figure, number, and proportion, and must carry along with them that demonstration and irresistible evidence which is the boast of that science. To this are we indebted for that accuracy which is attained, and the progress which has been made in some branches of mechanical philosophy; for when the motions are distinctly and minutely understood, and then considered only as mathematical quantities, independent of all physical considerations, and we proceed according to the just rules of mathematical reasoning, we need not fear any intricacy of combination or multiplicity of steps; we are certain that truth will accompany us, even though we do not always attend to it, and will emerge in our final proposition, in the same manner as we see happen in a long and intricate algebraic analysis.

⁹³ Mechanical philosophy, therefore, which is cultivated in this way, is not a system of probable opinions, but a *disciplina accurata*, a demonstrative science. To possess it, however, in this form, requires considerable preparation. The mere elements of geometry and algebra are by no means sufficient. Newton could not have proceeded *sine "sua mathefi facem preferente"*; and, in creating a new science of physics, he was obliged to search for and discover a new source of mathematical knowledge. It is to be lamented that the taste for the mathematical sciences has so prodigiously declined in this country of late years; and that Britain, which formerly took the lead in natural philosophy, should now be the country where they are least cultivated. Few among us know more than a few elementary doctrines of equilibrium; while, on the continent, we find many authors who cultivate the Newtonian philosophy with great assiduity and success, and whose writings are consulted as the fountains of knowledge by all our countrymen who have occasion to employ the discoveries in natural philosophy in the arts of life. It is

Mechanical Philosophy to the foreign writers that we have recourse in our seminaries, even for elementary treatises; and while the continent has supplied us with most elaborate and useful treatises on various articles in physical astronomy, practical mechanics, hydraulics, and optics, there has not appeared in Britain half a dozen treatises worth consulting for these last forty years; and this notwithstanding the unparalleled munificence of our present sovereign, who has given more liberal patronage to the cultivators of mathematical philosophy, and indeed of science in general, than any prince in Europe. The magnificent establishments of Louis XIV. originated from his insatiable ambition and desire of universal influence, directed by the sagacious Colbert.

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Notwithstanding the amplest encouragement from the crown.

And his patronage being exerted according to a regular plan in the establishment of pensioned academics, and in procuring the combined efforts of the most eminent of all countries, his exertions made a conspicuous figure, and filled all Europe with his eulogists. But all this was done without the smallest self-denial, or retrenchment of his own pleasures, the expences being furnished out of the public revenues of a great and oppressed nation; whereas the voyages of discovery, the expensive observations and geodetical operations in Britain, and the numberless unheard-of pensions and encouragements given to men of science and activity, were all furnished out of the private estate of our excellent sovereign, who seems to delight in repaying, by every service in his power, the attachment of a loyal and happy nation. It is therefore devoutly to be wished that his patriotic efforts were properly seconded by those whom they are intended to serve, and that the taste for the mathematical sciences may again turn the eyes of Europe to this country for instruction and improvement. The present seems a most favourable era, while the amazing advances in manufactures of every kind seem to call aloud for the assistance of the philosopher. What pleasure would it have given to Newton or Hally to have seconded the ingenious efforts of a Watt, a Boulton, a Smeaton, an Arkwright, a Dollond? and how mortifying is it to see them indebted to the services of a Belidor, a Bossut, a Clairaut, a Boscovich?

We hope to be pardoned for this digression, and return to our subject.

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Mechanical philosophy is almost wholly a mathematical study.

It appears from what has been said, that mechanical philosophy is almost wholly a mathematical study, and that it is to be successfully prosecuted only under this form: but in our endeavours to initiate the young beginner, it will be often found to require more steadiness of thought than can generally be expected for keeping the mind engaged in such abstract speculations. The object presented to the mind is not readily apprehended with that vivacity which is necessary for enabling us to reason upon it with clearness and steadiness, and it would be very desirable to have some means of rendering the conception more easy, and the attention more lively. This may be done by exhibiting to the eye an experiment, which, though but a single fact, gives us a sensible object of perception, which we can contemplate and remember with much more steadiness than any mere creature of the imagination. We could, by an accurate description, give such a conception of a room that the hearer should perfectly comprehend our narration of any occurrence in it: but one moment's glance at the room would be

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Experiments are, however, necessary to insure the attention of young minds.

infinitely better. It is usual therefore to employ experiments to assist the imagination of the beginner; and most courses of natural philosophy are accompanied by a series of such experiments. Such experiments, connected by a slight train of argumentative discourse, may even serve to give a notion of the general doctrines, sufficient for an elegant amusement, and even tending to excite curiosity and engage in a serious prosecution of the study. Such are the usual courses which go by the name of experimental philosophy: but this is a great misapplication of the term; such courses are little more than illustrations of known doctrines by experiments.

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EXPERIMENTAL PHILOSOPHY is the investigation of general laws, as yet unknown, by experiment; and it has been observed, under the article PHILOSOPHY, that this is the most infallible (and indeed the sole) way of arriving at the knowledge of them. This is the *Novum Organum Scientiarum* strongly recommended by Lord Bacon. It was new in his time, though not altogether without example; for it is the procedure of nature, and is followed whenever curiosity is excited. There was even extant in his time a very beautiful example of this method, viz. the Treatise of the Loadstone, by Dr Gilbert of Colchester; a work which has hardly been excelled by any, and which, when we consider its date, about the year 1580, is really a wonderful performance.

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Experimental philosophy defined and explained.

The most perfect model of this method is the Optics of Sir Isaac Newton. Dr Black's Essay on Magnesia is another very perfect example. Dr Franklin's Theory of Electricity is another example of great merit. That the investigation is not complete, nor the conclusions certain, is not an objection. The method is without fault; and a proper direction is given to the mind for the experiments which are still necessary for establishing the general laws.

It were much to be wished that some person of talents and of extensive knowledge would give a treatise on the method of inquiry by experiment. Although many beautiful and successful examples have been given as particular branches of inquiry, we have but too many instances of very inaccurate and inconclusive investigations. Experiments made at random, almost without a view, serve but little to advance our knowledge. They are like shapeless lumps of stone, merely detached from the rock, but still wanting the skill of the builder to select them for the different purposes which they may chance to serve; while well contrived experiments are blocks cut out by a skilful workman, according as the quarry could furnish them, and of forms suited to certain determined uses in the future edifice. Every little series of experiments by Margraaf terminates in a general law, while hardly any general conclusion can be drawn from the numberless experiments of Pott. Lord Bacon has written much on this subject, and with great judgment and acuteness of distinction; but he has exceeded in this, and has fatigued his readers by his numerous rules; and there is in all his philosophical works, and particularly in this, a quaintness and affectation that greatly obscures his meaning, so that this most valuable part of his writings is very little read.

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A good treatise on the method of inquiry by experiment is very necessary.

A formidable objection has been made to this method of inquiry. Since a physical law is only the

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An objection to experimental inquiry.

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The objec-
tion an-
swered,
with ex-
amples
showing the
nature and
certainty of
this mode
of inquiry.

expression of a general fact, and is established only in consequence of our having observed a similarity in a great number of particular facts; and since the great rule of inductive logic is to give the law no greater extent than the induction on which it is founded—how comes it that a few experiments must be received as the foundation of a general inference? This has been answered in very general terms in the article PHILOSOPHY. But it will be of use to consider the subject a little more particularly. Our observations on this subject are taken from in the dissertation on evidence by Dr Campbell in his *Philosophy of Rhetoric*.

An attentive consideration of the objects around us, will inform us that they are generally of a complicated nature, not only as consisting of a complication of those qualities of things called accidents, such as gravity, mobility, colour, figure, solidity, which are common to all bodies; but also as consisting of a mixture of a variety of substances, very different in their nature and properties; and each of these is perhaps compounded of ingredients more simple.

Moreover, the farther we advance in the knowledge of nature, we find the more reason to be convinced of her constancy in all her operations. Like causes have always produced like effects, and like effects have always been preceded by like causes. Inconstancy sometimes appears in Nature's works at *first sight*; but a more refined experience shows us that this is but an appearance, and that there is no inconstancy: and we explain it to our satisfaction in this way.

Most of the objects being of a complicated nature, we find, on an accurate scrutiny, that the effects ascribed to them ought often to be solely ascribed to one or more of these component parts, while the others either do not contribute to them, or hinder their production; and the variety of nature is so great, that hardly any two individuals of the same species are in every respect like any other. On all these accounts we expect dissimilarities in the phenomena accompanying perfectly similar treatment of different subjects of the same kind; but we find, that whenever we can be assured that the two substances are perfectly alike, the phenomena arising from similar treatment are the same: and long and extensive observation teaches us, that there are certain circumstances which insure us in the perfect similarity of constitution of some things. Whenever we observe the effect of any natural agent on one, and but one, of these, we invariably expect that the same will be produced on any other.

Should a botanist meet with a plant new to him, and observe that it has seven monopetalous flowers, he will conclude with the utmost confidence that every plant of this species will have monopetalous flowers; but he will not suppose that it will have seven, and no more than seven, flowers. Now these two facts seem to have no difference to warrant such a difference in the conclusion; which may therefore seem capricious, since there is but one example of both.

But it is not from this example only that he draws the conclusion. Had he never before taken notice of any plant, he would not have reasoned at all from these remarks. But his mind runs immediately from this unknown species to all the known species of this genus, and to all the genera of the same order; and having experienced in the *figure* of the flower an

uniformity in every species, genus, and order, which admits of no exception, but, in the *number* of flowers, a variety as boundless as are the circumstances of soil, climate, age, and culture, he learns to mark the difference, and draws the above-mentioned conclusions. Thus we learn, that *perfect* uniformity is not to be expected in any instance whatever, because in no instance is the simplicity of constitution sufficiently great to give us assurance of perfect uniformity in the circumstances of the case; and the utmost that our experience can teach us is a quick discrimination of those circumstances which produce the occasional varieties.

The nearer that our investigations carry us to the knowledge of *elementary* natures, the more are we convinced by general experience of the uniformity of the operations of real elements; and although it may perhaps be impossible for us ever to arrive at the knowledge of the simplest elements of any body, yet when any thing *appears* simple, or rather so exactly uniform, as that we have invariably observed it to produce similar effects on discovering any *new* effect of this substance, we conclude, from a general experience of the efficient, a like constancy in the energy as to the rest. Fire consumes wood, melts lead, and hardens clay. In these instances it acts uniformly, but not in these only. We have always found, that whatever of any species is consumed by it in one instance, has been consumed by it on trial at any time. If therefore a trial be made for the first time of its influence on any particular substance, he who makes it is warranted to conclude that the effect, whatever it may be, is a faithful representative of its effects on this substance in all past and future ages. This conclusion is not founded on this single instance, but upon this instance combined with the general experience of the regularity of this element in its operations.

This general conclusion, therefore, drawn from one experiment, is by no means in opposition to the great rule of inductive logic, but, on the contrary, it is the most general and refined application of it. General laws are here the real subject of consideration; and a law still more general, viz. *that nature is constant in all its operations*, is the inference which is here applied as a principle of explanation of a phenomenon which is itself a general law, viz. *that nature is constant in this operation*.

The foundation of this general inference from one experiment being so firmly established, it is evident that experiments must be an infallible method of attaining to the knowledge of nature; and we need only be solicitous that we proceed in a way agreeable to the great rule of inductive logic; that is, the subject must be cleared of every accidental and *unknown* circumstance, and put into a situation that will reduce the interesting circumstance to a state of the greatest possible simplicity. Thus we may be certain that the event will be a faithful representative of every similar case: and unless this be done in the preparation, nothing can result from the most numerous experiments but uncertainty and mistakes.

The account which has been given of mechanical philosophy would seem to indicate that experiment was not of much use in the farther prosecution of it. The two laws of motion, with the assistance of mathematics, seem fully adequate to the explanation of every phenomenon;

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Mathematics do not
superfede the use of
experi-

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phenomenon; and so they are to a *certain degree*. But this degree is as yet very limited. Our mathematical knowledge, great as it is in comparison with that of former times, is still insufficient for giving accurate solutions even of very simple (comparatively speaking) questions. We can tell, with the utmost precision, what will be the motions of two particles of matter, or two bodies, which act on each other with forces proportioned to the squares of the distances inversely; but if we add a third particle, or a third body, acting by the same law, the united science of all Europe can only give an approximation to the solution.

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Experiment is often the only resource.

What is to be done then in the cases which come continually before us, where millions of particles are acting at once on each other in every variety of situation and distance? How shall we determine, for instance, the motion of water through a pipe or sluice when urged by a piston or by its own weight? what will be its velocity and direction? It is impossible, in the present state of mathematical knowledge, to tell with any precision or certainty. And here we must have recourse to experiment. But if this be the case, must the experiment be made in every possible variety of situation, depth, figure, pressure? or is it possible to find out any general rules, founded on the general laws of motion, and rationally deduced from them? Or, if this cannot be accomplished, will experiment itself furnish any general coincidences which show such mutual dependences, that we may consider them as indications of general principles, though subordinate, complicated, and perhaps inscrutable? This can be discovered by experiment alone.

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Accurate experiments cannot always be made.

The attention of philosophers has been directed to each of these three chances, and considerable progress has been made in them all. Numerous experiments have been made, almost sufficient to direct the practice in many important cases, without the help of any rule or principle whatever. But there are many cases, and these of by far the greatest importance, such as the motion of a ship impelled by the winds, resisted by the water, and tossed by the waves, where distinct experiments cannot be made.

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Example of the necessity of experiment.

Newton, Bernoulli, D'Alembert, and others, have laboured hard to deduce from the laws of motion rules for determining what may be called the *average* motion of water in these circumstances, without attempting to define the path or motion of any individual particle; and they have actually deduced many rules which have a great degree of probability. It may here be asked, why do you say *probability*? the rules, as far as they go, should be *certain*. So they are: they are strict deductions from their premisses. But the premisses are only *suppositions*, of various degrees of probability, assumed in order to simplify the circumstances of the case, and to give room for mathematical reasoning; therefore these deductions, these rules, must be examined by experiment. Some of the suppositions are such as can hardly be refused, and the rules deduced from them are found to tally precisely with the phenomena. Such is this, "that the velocities of issuing water in similar circumstances are in the subduplicate ratio of the pressures." And this rule gives a most important and extensive information to the engineer. Other suppositions are more gratuitous, and the rules deduced from them are less coincident with

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the phenomena. The patient and sagacious Newton has repeatedly failed in his attempts to determine what is the *absolute velocity* of water issuing from a hole in the bottom of a vessel when urged by its weight alone, and the attempts of the others have hardly succeeded better. Experiment is therefore absolutely necessary on this head.

Those who have aimed at the discovery of *rules* purely experimental on this subject, have also been pretty successful; and the Chevalier Buat has, from a comparison of an immense variety of experiments made by himself and various authors, deduced an empirical rule, which will not be found to deviate from truth above one part in ten in any case which has yet come to our knowledge.

This instance may serve to show the use of experiments in mechanical philosophy. It is proper in all cases by way of illustration; and it is absolutely necessary in most, either as the foundation of a characteristic of a particular class of phenomena, or as argument in support of a particular doctrine. Hydrostatics, hydraulics, pneumatics, magnetism, electricity, and optics, can hardly be studied in any other way; and they are at present in an imperfect state, and receiving continual improvement by the labours of experimental philosophers in all quarters of the world.

Having in the preceding paragraphs given a pretty full enumeration of the different subjects which are to be considered in the study of natural philosophy, it will not be necessary to spend much time in a detail of the advantages which may reasonably be expected from a successful prosecution of this study. It stands in no need of panegyric: its intimate connection with the arts gives it a sufficient recommendation to the attention of every person. It is the foundation of many arts, and it gives liberal assistance to all. Indebted to them for its origin and birth, it has ever retained its filial attachment, and repaid all their favours with the most partial affection.

To this science the navigator must have recourse for that astronomical knowledge which enables him to find his place in the trackless ocean: and although very small scraps of this knowledge are sufficient for the mere pilot, it is necessary that the study be prosecuted to the utmost by some persons, that the unlearned pilot may get that scanty pittance which must direct his routine. The few pages of tables of the sun's declination, which he uses every day to find his latitude, required the successive and united labours of all the astronomers of Europe to make them tolerably exact: and in order to ascertain his longitude with precision, it required all the genius of a Newton to detect the lunar irregularities, and bring them within the power of the calculator; and, till this was done, the respective position of the different parts of the earth could not be ascertained. Vain would have been the attempt to do this by geodetical surveys independent of astronomical observation. It is only from the most refined mechanics that we can hope for sure principles to direct us in the construction and management of a ship, the boast of human art, and the great means of union and communication between the different quarters of the globe.

A knowledge of mechanics not much inferior to this is necessary for enabling the architect to execute

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The advantages derived from the study of philosophy

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In navigation,

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In architecture, some

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In gunnery
and other
engines,
&c.

some of his greatest works, such as the erection of domes and arches, which depend on the nicest adjustment of equilibrium. Without this he cannot unite economy with strength; and his works must either be clumsy masses or flimsy shells.

The effects of artillery cannot be understood or secured without the same knowledge.

The whole employment of the engineer, civil or military, is a continual application of almost every branch of mechanical knowledge; and while the promises of a Smeaton, a Watt, a Belidor, may be confided in as if already performed, the numberless failures and disappointments in the most important and costly projects show us daily the ignorance of the pretending crowd of engineers.

The microscope, the steam-engine, the thunder-rod, are presents which the world has received from the natural philosopher; and although the compass and telescope were the productions of chance, they would have been of little service had they not been studied and improved by Gilbert, Halley, and Dollond.

But it is not in the arts alone that the influence of natural philosophy is perceived: it lends its aid to every science, and in every study.

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In law,

It is often necessary to have recourse to the philosopher in disputes concerning property; and many examples might be given where great injustice has been the consequence of the ignorance of the judges. Knowledge of nature might have prevented many disgraceful condemnations for sorcery.

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In history,

The historian who is ignorant of natural philosophy easily admits the miraculous into his narrations, accompanies these with his reflections, draws consequences from them, and fills his pages with prodigies, fables, and absurdity.

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In medicine,

It is almost needless to speak of the advantages which will accrue to the physician from this study. So close is the connection between it and medicine, that our language has given but one name to the naturalist and to the medical philosopher. Indeed, the whole of his study is a close observation of the laws of material nature, in order to draw from them precepts to direct his practice in the noble art of healing. During the immaturity of general knowledge, while natural philosophy was the only study which had acquired any just pretension to certitude either in its principles or method of investigation, the physicians endeavoured to bring the objects of their study within its province, hoping by this means to get a more distinct view of it; and they endeavoured to explain the abstruse phenomena of the animal functions by reducing them all to motions, vibrations, collisions, impulses, hydrostatic and hydraulic pressures and actions, with which the mechanical philosophers were so ardently occupied at that time. But unfortunately their acquaintance with nature was then very limited, and they were but little habituated to the rules of just reasoning; and their attempts to explain the economy of animal life by the laws of mechanics did them but little service either for the knowledge of diseases or of the methods of cure. The mechanical theories of medicine, which had considerable reputation about the end of last century, were many of them very ingenious, and had an imposing appearance of symmetry and connection; but are now forgotten, having all been formed on the narrow sup-

position that matter was subject only to mechanical laws.

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But the discovery of error diminishes the chance of again going wrong, especially when the cause of error has been discovered, and the means pointed out of detecting the mistakes; and the vital principle must combine its influence with, or operate on, the properties of rude matter. It appears therefore evident that a knowledge of the mechanical laws of the material world is not only a convenient, but a necessary, accomplishment to the physician. We are fully justified in this opinion, by observing medical authors of the present day introducing into medicine theories borrowed from mechanical philosophy, which they do not understand, and which they continually misapply. Appearance of reasoning frequently conceals the errors in principle, and seldom fails to mislead.

But there is no class of men to whom this science is of more service than to those who hold the honourable office of the teachers of religion. Their knowledge in their own science, and their public utility, are prodigiously hurt by ignorance of the general frame and constitution of nature; and it is much to be lamented that this science is so generally neglected by them, or considered only as an elegant accomplishment: nay, it is too frequently shunned as a dangerous attainment, as likely to unhinge their own faith, and taint the minds of their hearers. We hope, however, that few are either so feebly rooted in the belief of the great doctrines of religion as to fear this, or of minds so base and corrupted as to adopt and inculcate a belief which they have any suspicion of being ill-founded. But many have a sort of horror at all attempts to account for the events of nature by the intervention of general causes, and think this procedure derogatory to the Divine nature, and inconsistent with the doctrine of his particular providence; believing, that "a sparrow does not fall to the ground without the knowledge of our heavenly Father." Their limited conceptions cannot perceive, that, in forming the general law, the Great Artist did at one glance see it in its remotest and most minute consequence, and adjust the vast assemblage so as completely to answer every purpose of His providence. There never was a more eager inquirer into the laws of nature, or more ardent admirer of its glorious Author, than the Hon. Robert Boyle. This gentleman says, that he will always think more highly of the skill and power of that artist who should construct a machine, which, being once set a going, would of itself continue its motion for ages, and from its inherent principles continue to answer all the purposes for which it was first contrived, than of him whose machine required the continual aid of the hand which first constructed it. It is owing to great inattention that this aversion to the operation of secondary causes has any influence on our mind. What do we mean by the introduction of secondary causes? How do we infer the agency of any cause whatever? Would we ever have supposed any cause of the operations of nature, had they gone on without any order or regularity? Or would such a chaos of events, any more than a chaos of existences, have given us any notion of a forming and directing hand? No surely. We see the hand of God in the regular and unvaried course of nature, only because it is regular and unvaried. The philosopher

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In religion,

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phers express this by saying, that the phenomena proceed by unalterable laws. Greatly mistaken therefore are they who think that we supersede the existence of mind and of providence when we trace things to their causes. A physical law being an unvaried fact, is an indication, and the strongest possible indication, of an unerring mind, who is incapable of change, and must do to day what He always did: for to change is to deviate from what is best*. The operations of unerring mind will therefore be regular and invariable. Physical laws, therefore, or secondary causes, are the best proofs of unerring wisdom. Such regularity of conduct is universally considered as indications of wisdom among men. The wise man is known by the constancy of his conduct, while no man can depend on the future conduct of a fool.

* Ferguson's
Lectures on
Ethics.

And what astonishing evidences of wisdom do we not observe in the general laws of the material world? They will ever be considered by the intelligent philosopher as the most glorious display of inconceivable wisdom, which has been able, by means so few and so simple, to produce effects which by their grandeur astonish our feeble understandings, and by their inexhaustible variety elude all possibility of enumeration.

While the teachers of religion remain ignorant of the beautiful laws of nature, the great characteristics of the wisdom and goodness of the Almighty Creator, their hearers are deprived of much sublime pleasure; God is robbed of that praise which he would have received from an enlightened people; and the only worship he receives is tainted with mean notions of his attributes, and groundless fears of his power.

Let not our minds be haunted with fear of the pernicious effects of philosophy, in consequence of the dreadful explosion which the vanity of man has lately made in France. The ruffians who now rule in that unhappy country, through the support of the licentious mob of Paris, are continually imputing to the illumination of philosophy the ardour which now animates them in the cause of liberty; and they are continually saying, that justice and morality are the order of the day. But their whole phraseology is equally a perversion of every thing in language and in sentiment. The sacred name of philosophy is as unfit for their faithless and bloody mouths as the names of liberty or virtue, and is equally misapplied. No wonder that religion fled from the torch of their philosophy: for their philosophy consists expressly in the confounding the most distinct classes of phenomena and of beings, in assimilating the heavenly animating spark within us to a piece of rude matter, and in degrading man to the level of the brutes, and thus shutting out his fairest prospects. It is not by the ordinary dialectics of the theologian that this sacrilegious confusion can be rectified: this requires an intimate acquaintance with what is characteristic of mind, and what is characteristic of matter, and a comprehensive view of the general laws which regulate the appearances in both classes of objects. Thus, and thus alone, will the divine be able to confute the detestable sophisms of Mirabeau and Diderot and the other *soi-disant* sages of France; and persuade their willing hearers to "render

unto Cæsar the things that are Cæsar's, and to God the things that are God's."

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Philosophy.

But besides these advantages which accrue to different classes of men from this study, there are some effects which are general, and are too important to be passed over unnoticed.

That spirit of dispassionate experimental inquiry which has so greatly promoted this study, will carry with it, into every subject of inquiry, that precision and that constant appeal to fact and experience which characterise it. And we may venture to assert, that the superior good order and method which distinguish some of the later productions in other sciences, have been in a great measure owing to this mathematical spirit, the success of which in natural philosophy has gained it credit, and thus given it an unperceived influence even over those who have not made it their study.

116
And in other
sciences.

The truths also which the naturalist discovers are such as do not in general affect the passions of men, and have therefore a good chance of meeting with a candid reception. Those whose interest it is to keep men in political or religious ignorance, cannot easily suspect bad consequences from improvements in this science; and if they did, have hardly any pretext for checking its progress. And discoveries accustom the mind to novelty; and it will no longer be startled by any consequences, however contrary to common opinion. Thus the way is paved for a rational and discreet scepticism, and a free inquiry on other subjects. Experiment, not authority, will be considered as the test of truth; and under the guidance of fair experience we need fear no ill as long as the laws of nature remain as they are.

117
More general
advantages of
philosophy.

Lastly, since it is the business of philosophy to describe the phenomena of nature, to discover their causes, to trace the connection and subordination of these causes, and thus obtain a view of the whole constitution of nature; it is plain that it affords the surest path for arriving at the knowledge of the great cause of all, of God himself, and for forming proper conceptions of him and of our relations to him: notions infinitely more just than can ever be entertained by the careless spectator of his works. Things which to this man appear solitary and detached, having no other connection with the rest of the universe but the shadowy and fleeting relation of coexistence, will, to the diligent philosopher, declare themselves to be parts of a great and harmonious whole, connected by the general laws of nature, and tending to one grand and beneficent purpose. Such a contemplation is in the highest degree pleasant and cheering, and cannot fail of impressing us with the wish to co-operate in this glorious plan, by acting worthy of the place we hold among the works of God, and with the hopes of one day enjoying all the satisfaction that can arise from conscious worth and consummate knowledge; and this is the worship which God will approve. "This universe (says Boyle) is the magnificent temple of its great Author; and man is ordained, by his powers and qualifications, the high priest of nature, to celebrate divine service in this temple of the universe."

Physiognomics.

PHYSIOGNOMONICS, among physicians, denote such signs as, being taken from the countenance, serve to indicate the state, disposition, &c. both of the

body and mind: and hence the art of reducing these signs to practice is termed *physiognomy*.

Physiognomics.

P H Y S I O G N O M Y,

Various definitions of physiognomy ancient and modern.

¹ **I**S a word formed from the Greek *φύσις* nature, and *γινωσκω* I know. It is the name of a science which occupied much of the attention of ancient philosophers, and which, since the revival of learning, has in a great degree been disregarded. Till of late it has seldom in modern times been mentioned, except in conjunction with the exploded arts of magic, alchemy, and judicial astrology. Within the two last centuries, no doubt, the bounds of human knowledge have been greatly extended by means of the patient pursuit of fact and experiment, instead of the hasty adoption of conjecture and hypothesis. We have certainly discovered many of the ancient systems to be merely creatures of imagination. Perhaps, however, in some instances, we have decided too rapidly, and rejected real knowledge, which we would have found it tedious and troublesome to acquire. Such has been the fate of the science of physiognomy; which certainly merits to be considered in a light very different from alchemy and those other fanciful studies with which it had accidentally been coupled. The work lately published by M. Lavater on the subject has indeed excited attention, and may perhaps tend to replace physiognomy in that rank in the circle of the sciences to which it seems to be intitled.

It does not appear that the ancients extended the compass of physiognomy beyond *man*, or at least animated nature: But the study of that art was revived in the middle ages, when, misled probably by the comprehensiveness of the etymological meaning of the word, or incited by the prevalent taste for the marvellous, those who treated of the subject stretched the range of their speculation far beyond the ancient limits. The extension of the signification of the term was adopted universally by those naturalists who admitted the theory of signatures (see SIGNATURE); and physiognomy came thus to mean, the knowledge of the internal properties of any corporeal existence from the external appearances. Joannes Baptista Porta, for instance, who was a physiognomist and philosopher of considerable eminence, wrote a treatise on the physiognomy of plants (*physiognomonica*), in which he employs physiognomy as the generic term. There is a treatise likewise *De Physiognomia Avium*, written we believe by the same person. In the *Magia Physiognomica* of Gaspar Schottus, *physiognomia humana* is made a subdivision of the science.

Boyle too adopts the extensive signification mentioned, which indeed seems to have been at one time the usual acceptation of the word (A). At present physiognomy seems to mean no more than "a know-

ledge of the moral character and extent of intellectual powers of human beings, from their external appearance and manners." In the Berlin Transactions for the years 1769 and 1770 there appears a long controversial discussion on the subject of the definition of physiognomy between M. Pernetty and M. Le Cat, two modern authors of some note. Pernetty contends, that *all knowledge whatever* is physiognomy; Le Cat confines the subject to the *human face*. Neither seems to have hit the medium of truth. Soon after the celebrated book of Lavater appeared. He indeed defines physiognomy to be, "the art of discovering the interior of man by means of his exterior; but in different passages of his work he evidently favours the extended signification of Pernetty. This work gave occasion to M. Formey's attack upon the science itself in the same Berlin Transactions for 1775. Formey strenuously controverts the extent assigned by Lavater to his favourite science.

² Before the era of Pythagoras the Greeks had little or no science, and of course could not be scientific physiognomists. Physiognomy, however, was much cultivated in Egypt and India; and from these countries the sage of Samos probably introduced the rudiments of this science, as he did those of many others, generally deemed more important, into Greece.

³ In the time of Socrates it appears even to have been adopted as a profession. Of this the well-known anecdote of the decision of Zopyrus, on the real character of Socrates himself judging from his countenance, is sufficient evidence. Plato mentions the subject; and by Aristotle it is formally treated of in a book allotted to the purpose.

⁴ It may be worth while to give a brief outline of Aristotle's sentiments on the subject.

Physiognomy, he in substance observes, had been treated of in three ways: Some philosophers classed animals into genera, and ascribed to each genus a certain mental disposition corresponding to their corporeal appearance. Others made a farther distinction of dividing the genera into species. Among men, for instance, they distinguished the Thracians, the Scythians, the Egyptians, and whatever nations were strikingly different in manners and habits, to whom accordingly they assigned the distinctive physiognomical characteristics. A third set of physiognomists judged of the actions and manners of the individual, and presumed that certain manners proceeded from certain dispositions. But the method of treating the subject adopted by Aristotle himself was this: A peculiar form of body is invariably accompanied by a peculiar dispo-

(A) They'll find i' the physiognomies
O' th' planets all mens destinies.

HUDIBRAS.

disposition of mind; a human intellect is never found in the corporeal form of a beast. The mind and body reciprocally affect each other: thus in intoxication and mania the mind exhibits the affections of the body; and in fear, joy, &c. the body displays the affections of the mind.

From such facts he argues, that when in man a particular bodily character appears, which by prior experience and observation has been found uniformly accompanied by a certain mental disposition, with which therefore it must have been necessarily connected; we are intitled in all such cases to infer the disposition from the appearance. Our observations, he conceives, may be drawn from other animals as well as from men: for as a lion possesses one bodily form and mental character, a hare another, the corporeal characteristics of the lion, such as strong hair, deep voice, large extremities, discernible in a human creature, denote the strength and courage of that noble animal; while the slender extremities, soft down, and other features of the hare, visible in a man, betray the mental character of that pusillanimous creature.

Upon this principle Aristotle treats of the corporeal features of man, and the correspondent dispositions, so far as observed: he illustrates them by the analogy just mentioned, and in some instances attempts to account for them by physiological reasoning.

At the early period in which Aristotle wrote, his theory, plausible certainly, and even probable, displays his usual penetration and a considerable degree of knowledge. He distinctly notices individual physiognomy, national physiognomy, and comparative physiognomy. The state of knowledge in his time did not admit of a complete elucidation of his general principles; on that account his enumeration of particular observations and precepts is by no means so well founded or so accurate as his method of study. Even his style, concise and energetic, was inimical to the subject; which, to be made clearly comprehensible, must require frequent paraphrases. Aristotle's performance, however, such as it is, has been taken as the groundwork and model of every physiognomical treatise that has since appeared.

The imitators of this great man in the 16th and 17th centuries have even copied his language and manner, which are sententious, indiscriminate, and obscure. His comparative physiognomy of men with beasts has been frequently though not universally adopted. Besides his treatise expressly on the subject, many incidental observations on physiognomy will be found interspersed through his other works, particularly in his history of animals.

5
Theophrastus's ethic characters form an important branch of physiognomy.

Next after Aristotle, his disciple and successor Theophrastus would deserve to be particularly mentioned as a writer on the subject in question. His ethic characters, a singular and entertaining performance, composed at the age of 99, form a distinct treatise on a most important branch of physiognomy, the *physiognomy of manners*: but the translations and imitations of La Bruyere are so excellent, that by referring to them we do greater justice than would otherwise be in our power, both to Theophrastus and to our readers. We cannot, however, omit observing, that the accuracy of

observation and liveliness of description displayed in the work of Theophrastus will preserve it high in classical rank, while the science of man and the prominent characteristics of human society continue to be objects of attention.

Polemon of Athens, Adamantius the sophist, and several others, wrote on the subject about the same period. Lately there was published a collection of all the Greek authors on physiognomy: the book is intitled, *Physiognomie veteris scriptores Græci. Gr. & Lat. a Franzio Altenb. 1780, 8vo.* From the number of these authors, it appears that the science was much cultivated in Greece; but the professors seem soon to have connected with it something of the marvellous. This we have cause to suspect from the story told by Apion of Apelles: *Imaginem adeo similitudinis indiscretæ pinxit, ut (incredibile dictu) Apion Grammaticus Scriptum reliquerit quemdam ex facie hominum addivinantem (quos melaposcopos vocant) ex iis dixisse aut futuræ mortis annos, aut præteritæ.* The novitiates of the Pythagorean school were subjected to the physiognomic observation of their teachers, and it is probable the first physiognomists by profession among the Greeks were of this sect. They, too, to whom, from the nature of their doctrines and discipline, mystery was familiar, were the first, it is likely, who exposed the science of physiognomy in Greece to disgrace, by blending with it the art of divination.

From the period of which we have been treating to the close of the Roman republic, nothing worthy of remark occurs in the literary history of physiognomy. About the last mentioned era, however, and from thence to the decline of the empire under the later emperors, the science appears to have been cultivated as an important branch of erudition, and assumed as a profession by persons who had acquired a superior knowledge in it.

In the works of Hippocrates and Galen, many physiognomical observations occur. Cicero appears to have been peculiarly attached to the science. In his oration against Piso, and in that in favour of Roscius, the reader will at the same time perceive in what manner the orator employs physiognomy to his purposes, and find a curious instance of the ancient manner of oratorical abuse.

Many physiognomical remarks are to be found likewise in the writings of Sallust, Suetonius, Seneca, Pliny, Aulus Gellius, Petronius, Plutarch, and others.

That in the Roman empire the science was practised as a profession, ample evidence appears in the writings of several of the authors just mentioned. Suetonius, for instance, in his *Life of Titus*, mentions that Narcissus employed a *physiognomist* to examine the features of Britannicus, who predicted that Britannicus would not succeed, but that the empire would devolve on Titus.

The science of physiognomy shared the same fate with all others, when the Roman empire was overthrown by the northern barbarians. About the beginning of the sixteenth century it began again to be noticed.—From that time till the close of the seventeenth, it was one of the most fashionable studies. Within that space have appeared almost all the approved modern authors on the subject (B.)

It

(B) They are, Bartholem. Cocles, Baptista Porta, Honoratus Nuquetius, Jacobus de Indagine, Alstedius, Michael

It has been unfortunate for physiognomy, that by many of these writers it was held to be connected with doctrines of which the philosophy of the present day would be ashamed. With these doctrines it had almost sunk into oblivion.

10
Particular studies have peculiarly prevailed at particular times.

In every period of the history of literature there may easily be marked a prevalence of particular studies. In the early period, for instance, of Grecian literature, *mythological morality* claimed the chief attention of the philosophers. In the more advanced state of learning in Greece and in Rome, *poetry, history, and oratory*, held the pre-eminence. Under the latter emperors, and for some time afterwards, the history of *theological controversies* occupied the greatest part of works of the learned. Next succeeded *metaphysics*, and *metaphysical theology*. These gave place to *alchemy, magic, judicial astrology*, the doctrine of signatures and sympathies, the *mystic, theosophic, and Rosicrucian theology*, with physiognomy. Such were the pursuits contemporary with the science which is the object of our present inquiry. It is no matter of surprise, that, so associated, it should have fallen into contempt. It is not unusual for mankind hastily to reject valuable opinions, when accidentally or artificially connected with others which are absurd and untenable. Of the truth of this remark, the history of theology, and the present tone of theological opinions in Europe, furnish a pregnant example.

To physiognomy, and the exploded sciences last mentioned, succeeded *classic philology*; which gave place to *modern poetry and natural philosophy*; to which recently have been added the studies of *rational theology, chemistry, the philosophy of history, the history of man, and the science of politics*.

11
The observations of the writers of the present century on this subject.

About the commencement of the eighteenth century, and thence forward, the occult sciences, as they are termed, had declined very considerably in the estimation of the learned; and those who treated of physiognomy forbore to disgrace it by a connection with those branches of ideal learning with which formerly it had been invariably conjoined. In Britain, Dr Gwithther noticed it with approbation.—His remarks are published in the *Philosophical Transactions*, vol. xviii.; and Dr Parsons chose it for the subject of the Croonian lectures, published at first in the second supplement to the 44th volume of the *Philosophical Transactions*, and afterwards (1747) in a separate treatise, entitled *Human Physiognomy explained*.

The observations, however, of these writers, as well as of Lancisius, Haller, and Buffon, relate rather to the transient expression of the passions than to the permanent features of the face and body. The well-known characters of Le Brun likewise are illustrative of the transient physiognomy, or (as it is termed) *pathognomy*.—See *PASSIONS in Painting*.

12
We find nothing very important till the controversy between Pernetty and Le Cat.

During the present century, although physiognomy has been now and then attended to, nothing of importance appeared on the subject till the discussion already

mentioned between Pernetty and Le Cat, in the *Berlin Transactions*. The sentiments of these authors, in so far as relates to the *definition* of physiognomy, have been above noticed. Their essays are besides employed in discussing the following questions: 1st, Whether it would or would not be advantageous to society, were the character, disposition, and abilities, of each individual so marked in his appearance as to be discovered with certainty?

2^{dly}, Whether, on the supposition that by the highest possible proficiency in physiognomy, we could attain a knowledge in part only of the internal character, it would be advantageous to society to cultivate the study, mankind being in general imperfect physiognomists?

No reasoning *a priori* can possibly determine these questions. Time and experience alone must ascertain the degree of influence which any particular acquisition of knowledge would have on the manners and characters of mankind; but it is difficult to conceive how the *result* of any portion of knowledge, formerly unknown, and which mankind would be *permitted* to discover, could be any thing but beneficial.

13
Soon after this controversy in the *Berlin Transactions*, appeared the great work of M. Lavater, dean of Zurich, which has excited no inconsiderable portion of attention in the literary world. The work itself is magnificent: that circumstance, as well as the nature of the subject, which was supposed to be fanciful, have contributed to extend its fame; and certainly, if we may judge, the book, though many faults may be detected in it, is the most important of any that has appeared on the subject since the days of Aristotle. Lavater professes not to give a complete synthetical treatise on physiognomy, but, aware that the science is yet in its infancy, he exhibits fragments only illustrative of its different parts. His performance is no doubt defective and unconnected. It contains, however, many particulars much superior to any thing that had ever before appeared on the subject.

With the scholastic and systematic method adopted by the physiognomists of the last and preceding centuries, Lavater has rejected their manner of writing, which was dry, concise, indeterminate, and general: his remarks, on the contrary, are for the most part precise and particular, frequently founded on distinctions extremely acute. He has omitted entirely (as was to be expected from a writer of the present day) the astrological reveries, and such like, which deform the writings of former physiognomists; and he has with much propriety deduced his physiognomical observations but seldom from anatomical or physiological reasoning. Such reasoning may perhaps at some future period become important; but at present our knowledge of facts, although extensive, is not so universal as to become the stable foundation of particular deductions. Lavater has illustrated his remarks by engravings; a method first adopted by Baptista Porta.—

Lavater's

Michael Schottus, Gaspar Schottus, Cardan, Taifnieri, Fludd, Behmen, Barclay, Claromontius, Conringius, the commentaries of Augustin Niphus, and Camillus Balbus on the *Physiognomica* of Aristotle, — Spontanus, Andreas Henricus, Joannes Digander, Rud. Goclenius, Alex. Achillius, Joh. Prætorius, Jo. Belot, Guliel. Gratalorus, &c. They are noticed in the *Polyhistor* of Morhoff. vol. i. lib. 1. cap. 15. § 4. and vol. ii. lib. 3. cap. 1. § 4.

Lavater's engravings are very numerous, often expressive, and tolerably executed.

14
His opinions the result of observation.

The opinions of this celebrated physiognomist are evidently the result of actual observation. He appears indeed to have made the science his peculiar study, and the grand pursuit of his life. His performance exhibits an extended comprehension of the subject, by a particular attention to *osseal* physiognomy, and the effect of *profiles* and *contours*. His style in general is forcible and lively, although somewhat declamatory and digressive. His expressions are frequently precise, and strikingly characteristic; and the spirit of piety and benevolence which pervade the whole performance render it highly interesting.

15
His imagination has, however, often outstript his judgment.

The defects of the work, however, detract much from the weight which Lavater's opinions might otherwise challenge. His imagination has frequently so far outstript his judgment, that an ordinary reader would often be apt to reject the whole system as the extravagant reverie of an ingenious theorist. He has clothed his favourite science in that affected mysterious air of importance which was so usual with his predecessors, and describes the whole material world to be objects of the universal dominion of physiognomy*. He whimsically conceives it necessary for a physiognomist to be a well-shaped handsome man†. He employs a language which is often much too peremptory and decisive, disproportioned to the real substance of his remarks, or to the occasion of making them. The remarks themselves are frequently opposite in appearance to common observation, and yet unsupported by any illustrations of his.

* Vol. I. p. 33—38.
Vol. II. p. 89.
French translation.
† Vol. I. p. 126.

16
Other weaknesses of this great physiognomist.

Lavater certainly errs in bestowing too great a reliance on single features, as the foundation of decision on character. His opinions on the physiognomy of the ears, hands, nails, and feet, of the human species, on hand-writing, on the physiognomy of birds, insects, reptiles, and fishes, are obviously premature, as hitherto no sufficient number of accurate observations have been made, in regard to either of these particulars, to authorize any conclusion. He has erred in the opposite extreme, when treating of the important topic of national physiognomy, where he has by no means prosecuted the subject so far as facts might have warranted. We must farther take the liberty to object to the frequent introduction of the author's own physiognomy throughout the course of his work. His singular remarks on his own face do not serve to prejudice the reader in favour of his judgment, however much his character may justify the truth of them. We must regret likewise, for the credit of the science, that the author's singularly fanciful theory of apparitions should so nearly resemble a revival of the antiquated opinions of the sympathists.

To these blemishes, which we have reluctantly enumerated, perhaps may be added that high impassioned tone of enthusiasm in favour of his science everywhere displayed throughout the work of this author, which is certainly very opposite to the cool patient investigation befitting philosophy. To that enthusiasm, however, it is probable that in this instance (as is, indeed, no unfrequent effect of enthusiasm) we are indebted for the excellency which the author has attained in his pursuit; and it possesses the salutary tendency of put-

ting us on our guard against a too implicit acquiescence in his physiognomical decisions.

In the Berlin Transactions for 1775, there appears a formal attack upon Lavater's work by M. Formey. This essay we have already mentioned. After disputing the propriety of the extensive signification applied by Lavater and Pernetty to the term physiognomy, M. Formey adopts nearly the same definition which we conceive to be the most proper, and which we have put down as such near the beginning of this article. He allows that the mental character is intimately connected with, and sensibly influenced by, every fibre of the body; but his principal argument against physiognomy is, that the human frame is liable to innumerable accidents, by which it may be changed in its external appearance, without any correspondent change of the disposition; so that it surpasses the extent of the skill of mortals to distinguish the modifications of feature that are natural from those which may be accidental. Although, therefore, the science of physiognomy may be founded in truth, he infers that the Deity only can exercise it.

17
His work was attacked in the Berlin Transactions by M. Formey.

M. Formey further contends, that education, diet, climate, and sudden emotions, may even the temperaments of ancestors, affect the cast of human features; so that the influence of mental character on these features may be so involved with, or hidden by, accidental circumstances, that the study of physiognomy must ever be attended by hopeless uncertainty. These objections are worthy of notice, but they are by no means conclusive.

We shall give a specimen of M. Lavater's manner of treating the subject on the opposite side of the question: a specimen, not in Lavater's precise words, but conveying more shortly an idea at once of his sentiments, and of his manner of expressing them.

18
Lavater's mode of treating his subject.

No study, says he, excepting mathematics, more justly deserves to be termed a science than physiognomy. It is a department of physics, including theology and belles lettres, and in the same manner with these sciences may be reduced to rule. It may acquire a fixed and appropriate character; it may be communicated and taught.

19
Physiognomy is justly called a science.

Truth or knowledge, explained by fixed principles, becomes science. Words, lines, rules, definitions, are the medium of communication. The question, then, with respect to physiognomy, will thus be fairly stated. Can the striking and marked differences which are visible between one human face, one human form, and another, be explained, not by obscure and confused conceptions, but by certain characters, signs, and expressions? Are these signs capable of communicating the vigour or imbecility, the sickness or health, of the body; the wisdom, the folly, the magnanimity, the meanness, the virtue, or the vice, of the mind?

It is only to a certain extent that even the experimental philosopher can pursue his researches. The active and vigorous mind, employed in such studies, will often form conceptions which he shall be incapable of expressing in words, so as to communicate his ideas to the feeble mind, which was itself unable to make the discovery: but the lofty, the exalted mind, which soars beyond all written rule, which possesses feelings and

20
Experiment is limited in extent.

and energies reducible to no law, must be pronounced unscientific.

21
Phyfiognomical truth may be defined and communicated to a certain length.

It will be admitted, then, that to a certain degree phyfiognomical truth may as a science be defined and communicated. Of the truth of the science there cannot exist a doubt. Every countenance, every form, every created existence, is individually distinct, as well as different, in respect of class, race, and kind. No one being in nature is precisely similar to another. This proposition, in so far as regards man, is the foundation-stone of phyfiognomy. There may exist an intimate analogy, a striking similarity, between two men, who yet being brought together, and accurately compared, will appear to be remarkably different. No two minds perfectly resemble each other. Now, is it possible to doubt that there must be a certain native analogy between the external varieties of countenance and form and the internal varieties of the mind? By anger the muscles are rendered protuberant: Are not, then, the angry mind, and the protuberant muscles, as cause and effect? The man of acute wit has frequently a quick and lively eye. Is it possible to resist the conclusion, that between such a mind and such a countenance there is a determinate relation?

Every thing in nature is estimated by its phyfiognomy; that is, its external appearance. The trader judges by the colour, the fineness, the exterior, the *phyfiognomy* of every article of traffic; and he at once decides that the buyer "has an honest look," or "a pleasing or forbidding countenance."

22
This knowledge, however improved, would not be detrimental to man.

That knowledge and science are detrimental to man, that a state of rudeness and ignorance are preferable and productive of more happiness, are tenets now deservedly exploded. They do not merit serious opposition. The extension and increase of knowledge, then, is an object of importance to man: and what object can be so important as the knowledge of man himself? If knowledge can influence his happiness, the knowledge of himself must influence it the most. This useful knowledge is the peculiar province of the science of phyfiognomy. To conceive a just idea of the advantages of phyfiognomy, let us for a moment suppose that all phyfiognomical knowledge were totally forgotten among men; what confusion, what uncertainty, what numberless mistakes, would be the consequence? Men destined to live in society must hold mutual intercourse. The knowledge of man imparts to this intercourse its spirit, its pleasures, its advantages.

23
It affords great mental gratification.

Phyfiognomy is a source of pure and exalted mental gratification. It affords a new view of the perfection of Deity; it displays a new scene of harmony and beauty in his works; it reveals internal motives, which without it would only have been discovered in the world to come. The phyfiognomist distinguishes accurately the permanent from the habitual, the habitual from the accidental, in character. Difficulties, no doubt, attend the study of this science. The most minute shades, scarcely discernible to the unexperienced eye, denote often total opposition of character. A small inflexion, diminution, lengthening or sharpening, even though but of a hair's breadth, may alter in an astonishing degree the expression of countenance and character. How difficult then, how impossible indeed, must this variety of the same countenance render precision? The seat of character is often so hidden, so mask-

24
Difficulties in the study

ed, that it can only be detected in certain, perhaps uncommon, positions of countenance. These positions may be so quickly changed, the signs may so instantaneously disappear, and their impression on the mind of the observer may be so slight, or these distinguishing traits themselves so difficult to seize, that it shall be impossible to paint them or describe them in language. Innumerable great and small accidents, whether physical or moral, various incidents and passions, the diversity of dress, of position, of light or shade, tend to display the countenance often in so disadvantageous a point of view, that the phyfiognomist is betrayed into an erroneous judgment of the true qualities of the countenance and character. Such causes often occasion him to overlook the essential traits of character, and to form a decision on what is purely accidental.—How surprisingly, for instance, may the smallpox disfigure the countenance, and destroy or confound, or render imperceptible, traits otherwise the most decisive?

25
We shall, then, continues Lavater, grant to the opposer of phyfiognomy all he can ask; and yet we do not live without hopes that many of the difficulties shall be resolved which at first appeared inexplicable.

26
He then proceeds to a specific illustration of his subject under a great variety of titles, in which he treats of human nature in general, and of each particular feature separately.

To enumerate the different divisions of his book would not be more satisfactory to our readers than the perusal of the *contents* of the book itself; and an attempt to epitomize even the essential substance of the vast multiplicity of matter contained in his essays, (which are yet only *fragments*, and to which indeed he himself does not pretend to give any higher appellation), would extend this article to a disproportionate length. Such an abridgement, after all, would convey no solid information on a subject which merits all the time and study that an attentive perusal of Lavater's works at large would require.

27
From the historical deduction of the literary progress of phyfiognomy which we have thus attempted to lay before our readers, it appears, that although the science has fallen into disrepute, there can scarcely be mentioned a period in which any cultivation of science took place when phyfiognomy was not likewise the study, nay sometimes even the profession, of men of the most eminent abilities and the greatest learning.

The reasons why at present so little attention is paid to the subject probably are,

1st, That it has been treated in conjunction with subjects now with propriety exploded: And,
2^{dly}, That it has been injured by the injudicious assertions and arguments of those who have undertaken its defence.

Sometimes, however, the wise and the learned may err. The use of any thing must not be rejected for no better reason than that it is capable of abuse. Perhaps the era is not distant when phyfiognomy shall be reinstated in the rank which she merits among the valuable branches of human knowledge, and be studied with that degree of attention and perseverance which a subject deserves so essentially connected with the science of man.

That there is an intimate relation between the disposition

28 There is a relation between the dispositions of the mind and the features of the face. positions of the mind and the features of the countenance is a fact which cannot be questioned. He who is sinking under a load of grief for the death of an affectionate wife or a dutiful child, has a very different cast of features from the man who is happy in the prospect of meeting his mistress. A person boiling with anger has a threatening air in his countenance, which the most heedless observer never mistakes; and if any particular disposition be indulged till it become habi-

tual, there cannot be a doubt but that the corresponding traces will be so fixed in the face as to be discernible by the skilful physiognomist, under every effort made to disguise them. But when we attempt to decide on a man's intellectual powers by the rules of this science, we are often deceived; and in this respect we have reason to believe that Lavater himself has fallen into the grossest mistakes.

PHYSIOLOGY,

1 Definition. IS a Greek word, which, in strict etymology, signifies that which discourses of nature: but in its common use, it is restricted to that branch of physical science which treats of the different functions and properties of living bodies; while by living bodies are meant those which are by a certain organized structure enabled to grow and propagate their kind.

By this definition, physiology must necessarily have for its object the explanation of that internal organical economy in plants and animals, which nature has devised for the preservation of the individual, and for the continuance and propagation of the species.

2 Division. It is naturally divided into two kinds, particular and general. The former treats of the properties and functions of the individual or species, as may be seen in the article ANATOMY; the latter is the subject of our present discussion, and treats of those functions and properties which are general or common to all living bodies.

3 Utility of physiology. To the genuine naturalist no subject presents such a field of amusement and instruction. When as complete as the state of cotemporary science will admit, it will exhibit a general result of all those experiments and observations that have purposely been made or occasionally contributed to illustrate the phenomena of animated matter; and when it shall reach that summit of perfection to which the efforts of genius may carry it, it may be enabled to diffuse a light, of which the naturalist of the present day can have no just or adequate conception: Particularly in physic, anatomy, botany, and in natural history, its happy effects may be numerous and great. On many occasions it may there introduce order for confusion, certainty for doubt; and may be expected to enthrone science in various places which are now occupied by fancy and conjecture.

4 Its near approach to metaphysics, and the difference pointed out. Of all the branches of physical science it certainly makes the nearest approach to the region of metaphysics; but yet there is a difference between these, though it may not be very easy to point out the precise line of termination. Physiology, as already defined, being that science which has for its object the organical economy of living bodies, the word organical, we think, here should mark the distinction.

Wherever the economy of living bodies indicates design, and cannot result from any combination or structure of organs, it must be supposed the effect of something different from matter, and whose explanation belongs to that which is called *metaphysics*, or which we might term the *philosophy of mind*. By ascribing indeed to the glandular contents within the cranium and to

that fiction animal spirits, the motives of action, the superficial and ill informed may have been led to an opinion that perception, memory, and imagination, are the functions of the cerebrum, the medulla oblongata, and cerebellum; that the soul is a consequence of organization; and the science which treats of it only a particular branch of physiology. But mind and its faculties are now so well understood and investigated, that this opinion can seldom prevail but where penetration is not remarkable for its acuteness, or where reflection, reading, and research, have long been confined within the limits of a narrow circle.

Instead of mind being the effect of organization, we readily allow that every living system of organs supposes mind, and that in the study of such systems the physiologist must often meet with many phenomena that are less singular than simple perception, and yet for which he cannot account by any knowledge which he possesses of organic powers. This truth we partly acknowledge, when, like ancient Athens erecting her altars to unknown gods, we retreat to those asylums of ignorance, the vis insita, the vis nervea, the vis vitalis, the vis medicatrix, and a number of others of the same kind.

5 We choose here to mark precisely the bounds of physiology, because we have always been led to imagine that it would be extremely fortunate for science that all its divisions were accurately defined, that each were restricted to its own sphere, where alone it is useful, and were never allowed to make encroachments on the province of another, where its only tendency can be to mislead and subvert all ideas of arrangement.

In its progress of improvement, physiology has been much and often retarded from a want of attention to this circumstance. The time has been when its place was occupied almost entirely by an absurd and ridiculous philosophy, which accounted for every thing by an hypothesis, and which pretended to cure wounds a hundred miles distant by a powder of sympathy.

6 Nay, as if its nature were not yet ascertained, in some books whose titles promise much information on the functions of organs, we meet with only a pleasing account of design and intelligence, and a few lessons, when the fancy is warm, how to exclaim and how we should wonder; or, after similar professions in the titles of others, we are presented with only a curious display of the art of logic. To a fact or two we see numerous chains of reasoning appended. On these chains are hanging important and general conclusions; and these conclusions afterwards uniting, suspend an elaborate

Preliminary observations.

The bounds of physiology, and the consequences of not attending to them.

6 Introduction of logic into physiology.

Preliminary observations.

borate system of pathology. The whole has a wonderfully specious appearance; but upon applying the touchstone of experiment, the system falls, the conclusions turn out to be false, the chains are found connected with the fact by only a conjecture or some popular opinion of the time; most of their links are creations of fancy, and their joinings such logical associations as have no analogy or prototype in nature.

7
And of mathematics.

Instead of logic, however, a pompous parade of mathematical learning has been *sometimes* introduced. This has always an imposing aspect, and its presence here may require to be examined with some care. It must be allowed, that it would have indeed been rather surprising if logic and metaphysics had been employed, and mathematics carrying science in their name had not been thought of. Their character had always been deservedly high; and there was scarcely a department of knowledge to which they had not in some respect contributed their aid: their researches, too, had not been confined to mere number and quantity alone; they had explained the momentum of bodies, and all those motions which arise from percussion and gravitation; they had ascertained the distance of the stars, the velocity, magnitude, and orbits of the planets; they had accounted for the phases of the moon, the phenomena of eclipses, and return of comets; and bringing their knowledge from the heavens to the earth, they had shown the causes of the days and nights, of the years and the seasons, in all their varieties throughout the globe: they had taught the chronologer how to dispose of the periods of time, and how he might best assist the historian to arrange his events: they had pointed out the origin of tides; had informed the mariner how to direct his course through the ocean; and had taught the geographer how to describe the regions of the earth, and assist the traveller in his laudable pursuits after knowledge and science: they, in short, had unfolded the wonders of mechanism; and, diffusing light over every branch of that philosophy which is called *mechanical*, and has long been dignified with the name of *natural*, had afforded the finest specimens of reasoning with which the human mind is acquainted.

8
Introduced by Bellini.

A science of such distinguished utility could hardly fail to excite the admiration of all who knew it, or even had heard of it. And at a period when it was fashionable, it was scarcely possible for the physiologist to pass it unnoticed: the truth is, he very soon discovered its excellency. Bellini of Florence first introduced it; and it was at last so warped with physiology, that there were some who could hardly conceive a physiology existing without it. The justly celebrated Professor Borelli, one of its most enthusiastic admirers, employed it so well in showing how the muscles acted as ropes and the bones as levers, that he thence explained with the happiest effect the phenomena of standing, of walking, of leaping, of flying, and of swimming, in different animals: this task he performed in the first part of his famous work *De Motu Animalium*. But, wishing to know more of the animal economy, and feeling himself inspired with new hopes, he ventured in the second to explain also in the same way the interior motions and their proximate causes on the principles of mechanism: he there gives a minute account of the motion of the muscles, of the heart and its pulsation, of the circulating blood, of the office of the lungs, the kid-

9
Extended by Borelli.

neys, and the liver, of the nervous fluid and the seminal secretion; of vegetation, generation, nutrition, of hunger and thirst, of pain, of lassitude, and the heat of fever.

Preliminary observations.

Mathematics by him were considered as almost universal interpreters; for except the mechanical he seemed to acknowledge no other secondary powers in nature. He thought, with Plato, that God himself was always geometrising; and was fully persuaded that physical knowledge could not be acquired but through the medium of geometrical demonstrations and forms. These opinions had begun to be general, when his learned work was published at Rome in the year 1676; and they were no unequivocal symptoms that the reigning philosophy of that time was now in the last stage of decay.

Still, however, as the spirit of that philosophy was not wholly extinguished, physiology continued to be much infected with its metaphysical and logical disputes, and with its physical doctrines of forms of particular ferments, its antipathies, sympathies, its occult qualities, and subtle atoms.

For these reasons, in his inaugural dissertation at Leyden, delivered in the year 1692, the learned Pitcairn expresses a wish that medicine were made a distinct science; that it were established on mechanical principles, on fewer postulates, and more data; and that it were supported by a clear train of mathematical reasoning, which would defy the attacks of the sophist, and which would not be liable to the fluctuations of opinion and prejudice. These sentiments were warmly supported by the great Boerhaave, who, in his aphorisms, has founded his reasonings on the structure of the parts and the laws of mechanics, and to whom an edition of Borelli was dedicated in 1710.

10
By Pitcairn, and others.

Pitcairn, however, was not content with barely expressing his wishes. Seeing with regret that the state of medicine could never be improved as long as it was connected with the philosophy which was then in fashion, he seemed anxious to effect a separation; and for such a step he wished to have only some plausible pretext. This pretext was not long wanting; and was, to be sure, one of the most whimsical that could well have presented itself to his fancy. It occurred to him that the study of medicine was prior to philosophy; that it had begun its course with astronomy, at the time when diseases were supposed the consequence of offended Deity; that all along, as it had shared the fate of astronomy, and had equally suffered in the common disgrace of judicial astrology, it was highly reasonable, in his opinion, that it should still follow the fate of its friend; that it should be established on similar principles, and should be demonstrated by that reasoning which might experience the shock of ages without being moved. So attached was he to the geometrical mode of demonstration, that in his dissertations he appeared to consider it as indeed the only species of evidence, excepting the senses, that could be relied on. But here he was certainly venturing too far; so rash an opinion, and one which, had he previously consulted with prudence, might have been suppressed, was fatal to his cause. We must here therefore date the commencement of those attacks to which his system was afterwards exposed. Such an indiscreet species of pedantry was but ill calculated to procure a generally favourable reception for a book with so extraordinary a title as the *Physico-mathematical*

11
Abused.

Preliminary observations.

12 Rejected.

mathematical Elements of Medicine. Many learned and ingenious men, the greater part of whose knowledge had depended chiefly on the evidence of testimony, were now disposed to examine, with a steady and awakened eye, his boasted demonstrations. The consequence was that which might have been expected: the result of their inquiries was wholly inauspicious to those new applications of geometry; they found that his facts and experiments were few, that his postulates were endless, and that no mathematical reasoning whatever could extract truth from a false hypothesis, or could fairly deduce a general conclusion from particular premises. The Doctor, they observed, had imposed upon himself, in imagining that either certainty or truth was naturally inherent in any mere geometrical forms; these forms, they said, had been often abused: Plato had thought them somewhat divine; the superstitious had employed them as charms; Pythagoras had made them the symbols of his creed; and even in the writings of the learned Professor himself they frequently served no other purpose but to give an air of importance to trifles; to bestow on error the appearance of science; and to give a simple and a trite remark the look of research, and of acute and profound erudition.

13 Perhaps too rashly.

It is unnecessary to recal here the satirical wit, or more properly the scurrilous abuse, with which this system and its author were treated. The mechanic physiology has now sunk into such contempt, that the most illiterate affect to smile at the mention of its name; they seem to forget, or, what is more probable, they never knew, that it once was honoured with the great names of Borelli, Boerhaave, and Newton; and their reading perhaps cannot inform them that it was a noble step to improvement; that it explained the structure of the eye, the movement of the bone, and force of the muscle, and that it may yet perhaps be the means of many interesting discoveries in the living body: discoveries, however, which Heaven will reserve for other minds than those which it makes merely to receive the impressions of the day.

14 Introduction of chemistry.

A frequent mistake into which the mechanical philosophers had fallen, was their hopes of being able to account for digestion by the muscular force and action of the stomach. The more they reasoned from this supposition, the more widely they wandered from the truth. A thought of Vallisneri, that in acting mechanically, the stomach was as liable to be affected as its contents, gave a hint to Reaumur. On this hint he began immediately a set of experiments; and from a number that were clear and decisive, concluded that digestion was performed by a solvent. Here was a fair introduction to chemistry; the action of solvents was never yet satisfactorily explained by mechanic powers. A new era therefore commences; and chemistry now, in physiological investigations, holds that place which was formerly possessed by geometry and mechanics.

15 Chemical investigations.

Nor is chemistry undeserving of this rank. From a small beginning, and from modestly professing to observe merely the different phenomena which are the effects of heat and of mixture, it has risen like astronomy to the first eminence among the sciences. By its numerous researches it has found widely diffused over nature a variety of singularly active bodies, which are called *salts*. Of these salts it has noticed some which

change a blue vegetable tincture into green, and others which change that tincture into red: the former of these it has called *alkalis*, and the latter are known by the name of *acids*. It has observed, that when acids and alkalis are brought into contact, and either of them nearly in a fluid state, they encounter with violence, effervescence and heat, and form a salt, which being neither acid nor alkaline, is called *neutral*. It has been remarked that all these salts, whether volatile or fixed, whether fluid or concrete, have each permanently uniform characters; and that, though sometimes blended in a mixture, or made to vanish in a solution, yet when they are separated they resume their taste, their smell, their colour, and their form, and exhibit, as before, the same power in dissolving earths, metals, and stones, and in making inflammable bodies to smoke, to kindle, and explode with a loud noise. All, however, act not alike upon all bodies; those acids which dissolve iron remain quite harmless upon gold. And chemistry here has been led to observe that particular salts show a preference for particular bodies, that there is in them an appearance of choice, and that their character is never to be known but by studying their different elective attractions.

Preliminary observations.

17 Gases.

Besides salts, chemistry of late has also discovered a number of bodies that are still more wonderful, still more active, and some of them at least still more widely diffused over nature. These are certain aeriform fluids which are called *gases*: these gases, like the mind itself, are discernible only by their effects; all are elastic, and all are combined with the principle of heat. Their kinds are various; some are inflammable, some are saline and soluble in water, some are neither the one nor the other, and some distinguished by the name of *airs*, maintaining combustion and respiration: their importance is such that there is not a single process in chemistry, nor perhaps one regular process in nature, "in which the phenomena of the disengagement or fixation of heat, and the disengagement or fixation of elastic fluids, are not observed either separately or together." Two of these fluids compose water, two the nitric acid, two ammonia, and three of them are found in atmospheric air; one of them is thought, with a good deal of reason, to be the alkaligenous principle in bodies, and two of them to be the constituents of oil: the principle of acidity is already known to be one of the two which compose water. The same fluid oxidates metals, supports flame during combustion, communicates heat to the circulating blood, and maintains life in the act of respiration.

By that knowledge which it thus has acquired of salts and of gases, by its more ingenious modes of analysis, and by some discoveries which it has made concerning the nature of heat and of light, chemistry is now able to account for many phenomena that before were inexplicable. In France particularly it has been recently extending its researches with a good deal of ardour towards the phenomena of both the animal and vegetable kingdoms: it has there found its salt and its gases, its heat, and its light, active and busy.

It is more than a century since it observed that plants were nourished by pure water and atmospheric air; of plants that from these alone they derived their extracts, their mucilage, their oil, their coal, their acids, their alkalis, and aroma. But since the discovery of different kinds

18

Preliminary
observations.

of elastic fluids, it has farther remarked that they grow rapidly in hydrogenous gas (A), and in air mixed with carbonic acid; that assisted by light their leaves absorb hydrogen from water, carbone from the acid of which they are so fond; and thus decomposing the one and the other, disengage from both the oxygenous principle or vital air, and restore to the atmosphere salubrity and health.

19
Animal
powers.

Leaving vegetables, which, by analysis in close vessels and in red-hot pipes, it has reduced to hydrogen, oxygen, azote, and charcoal, it has made discoveries no less important in the animal kingdom. It has found that the food of the nobler animals, which immediately or remotely is prepared by vegetables, is generally acted upon by a solvent: it has proved by experiment that the animal organs can fix azote; can decompose atmospheric air; can form lime, iron, and carbonic acid, as well as vegetables, produce a number of saline substances, which no art could detect in their food. Nor is it here that such discoveries are meant to terminate; these seemingly creative powers of vegetation and of animalization, with other phenomena in the structure and economy of living bodies, chemistry imagines that it will yet be able to explain. We may safely venture, however, to predict that something more than its present knowledge of the various effects of heat and of mixture will in this case be found necessary to ensure success. The late discovery of elastic fluids and their singular properties afford the strongest reasons to suspect that we yet may be ignorant of many agents which nature employs in the functions of bodies. But whatever be the truth, we are almost certain that these agents discovered

20
Electricity
and magnetism.

by the chemists are not alone concerned. Electricity, magnetism, and what have been called animal electricity and animal magnetism, must not be excluded from acting some part. The growth of plants, it is well known, is considerably affected by the electrical state of the atmosphere; it is sensibly promoted by a proper use of the vegeto-electrometer, and has been said to indicate a difference between the negative and positive electricities, whether these be kinds or states of the fluid. Such too is our present knowledge, that electricity as yet seems the only cause to which we can ascribe the seeming chemical affinities of the dew; its constant practice in avoiding some bodies, its predilection for others, and particularly its attachment to the living points of plants and of leaves: nor is this electricity wholly unconnected with the animal kingdom; when we think of its singular fondness for points, it occurs that one intention of our hairs may probably have been to collect and diffuse it. It is plainly excited in cross rubbing the hair of some animals, and when we wear silk, it is frequently accumulated upon the surface of our own bodies.

The iron found in plants and in animals is certainly somewhat of a striking circumstance, and cannot be denied to be one reason why magnetism should not be wholly overlooked.

21
Animal
electricity.

As for animal electricity, or what has been called so, it is now, we believe, generally allowed to hold an important place in the system. It is very perceptible

in all those nerves which are subservient to voluntary motions; nor is it limited to these alone. In several instances where metals were applied to the nerves of the heart, which nature has destined to spontaneous motions, they were seen to awaken the dormant powers in the muscular fibres of that viscus. We here speak only of the nerves; but the *Torpedo*, the *Gymnotus electricus*, and *Silurus electricus*, possess a particular structure of organs for collecting this fluid, for discharging it at pleasure, and for giving a shock. If those who are accustomed to the common kind of electrical experiments, may at first be surprised that this electric fluid in the animal is not discharged from the nerves by water, or any other metallic conductor that is pure and unmixed, another fact, which is fully as striking, though it has not been hitherto mentioned by any observer known to us, appears to merit equal attention: Cut away the leg of a frog, uncover a part of the crural nerve, place the limb now on a table on which an electrifying machine is working, you will see the muscles strongly convulsed at every spark which you draw from the conductor, but remaining motionless upon the discharge of the Leyden phial.

22
And animal
magnetism.

Animal electricity naturally suggests animal magnetism. This last has been productive of more wonders in the human frame than all the preceding agents together. Under the management of Mesmer at Paris, and his pupil Deslon, it filled all who observed its effects with surprise and astonishment. It seemed to unhinge the powers of the mind, and affect the whole animal economy; it excited the most extraordinary emotions; it roused and allayed the different passions; it changed aversion into love, and love into aversion; it created pain, it healed wounds, and cured diseases as if by enchantment.

These discoveries were made by a quack, who knew not the cause by which he produced so singular appearances. The celebrated Franklin, who first supposed that the electrical fluid was the thunder, was placed at the head of those gentlemen who demonstrated that this species of magnetism was the same power that had long been known under the name of *imagination*.

This last discovery, if the blushing pride of modern philosophy could but stoop to improve an important hint, though originally suggested by an empiric, might greatly enlarge our knowledge of mind, and explain some things in the animal economy which appear yet to require a solution. At any rate, it sufficiently proves that the influence of mind is very extensive in the higher parts of animal creation. Many facts would argue that it increases as we rise in the scale: but the sole intention here was to show, that chemical agents are neither almighty nor everywhere present; that in the internal organical economy of living bodies they act but a part; and that, like the other agents in nature, they are obliged to confine their operations within those limits which the great Author of being has prescribed.

The aid which anatomy affords to physiology is now to be considered. Physiology in general and the study of physiology.

23

(A) Hydrogenous gas acts with more energy than any other substance in dissolving carbone; it mixes with carbonic acid and with azote, and sometimes holds in solution sulphur and phosphorus. See Fourcroy's Discourse on modern chemistry.

Preliminary observations.

study of anatomy are so closely connected, that, as Haller imagined, they can hardly be separated even in idea. In his opinion, the man who should attempt to become a physiologist without anatomy, would act as wisely as the mathematician who, without seeing the wheels or the pinions, or without knowing the size, the proportions, or the materials of any machine, would yet presume from mere calculation to determine its powers, its properties, and uses. In this comparison, the importance of anatomy, we are really persuaded, is not represented in a light too strong; nor does that medium through which it has been viewed appear to have magnified beyond nature.

24 Anatomy a distinguished branch of human knowledge.

Whether art or science, anatomy is one of those eminent accomplishments without which no one is able to prosecute his studies with half that pleasure and success which he might in either the animal or vegetable kingdoms. Having been always accustomed to assign it one of the highest and most honourable places among those branches of human knowledge which are styled liberal, we must be excused if we dwell a little in exposing an attempt to convert it to a craft.

25 The illiberality of some of its professors.

It is with surprise, and a mixture of regret, that we see a writer of distinguished merit wishing thus to degrade it, and seeking to confine it as well as physiology to that profession which chanced to be his own. The dignity of a science, which he considered as his glory and his pride, should have certainly extinguished in a generous mind the low and disgusting policy of his trade. It is indeed with reason that he thinks it unfortunate, "that those who, from the nature of their education, are best qualified to investigate the intricacies, and improve our knowledge of the animal economy, are compelled to get their living by the practice of a profession which is constant employment." We lament the misfortune as much as he can; but we reason not from it in the same way. Instead of complaining that "idle professional men," particularly "of the church, should become philosophers and physiologists as it were instinctively," we are happy to learn that men of enlightened and cultivated minds are thus so readily disposed to assist us; that nature conducts them as it were by instinct; and that happily they enjoy all that leisure which is deemed so necessary for such an undertaking. The genius of some, and the liberal education which they all must have had opportunities of acquiring, by no means impress us with any unfavourable ideas of their aid.

Our author allows them to look through microscopes and examine the red globules of the blood: They may too, he says, view animalculæ, and give us a candid relation of what they see; but should not presume to carry their reasoning into a science of which they can know nothing, or hope to throw light on a subject which it is impossible they can understand. But, to speak freely, after considering the great physiological discovery of Priestley with respect to *respiration*, the most important probably, not even excepting that of the *system of absorbents*, that the science has witnessed in the present age, we see no grounds for prescribing such laws or fixing such limits: and although he may treat the illustrious Reaumur and Abbé Spallanzani as nothing more than makers of experiments, and declare a resolution to place no confidence in those which are made by *gentlemen and priests*; he

will not certainly deny that others have as well as he a just right to think for themselves.

Were such sentiments to become universal, it is difficult to say what would be the consequence. In this country, the law and the church require from their members a formal certificate, that, besides the professional, they have also attended some literary classes at the university. To our medical classes boys are admitted from the shop and from the school, and may afterwards pass the two colleges of surgeons and physicians, by exhibiting a little skill in their art, or at least by paying the stated fees. On these accounts, being anxious already for the fate of a profession which we respect, and considering the degeneracy to which it is exposed, not we hope the degeneracy into which it is sinking, we should be sorry to see it deprived of that respectability which it may derive from the countenance of men possessing general literature and science.

It is very true, that gentlemen and priests may not be anatomists; and not a few anatomical disputes might seem to insinuate, that persons may be very eminent anatomists without being either gentlemen or priests. Still, however, there is nothing incompatible in those characters; and, were we to judge from their writings, it was certainly a thing of which Bacon, Newton, and Locke, never dreamed, that the study of the priest, or the mere circumstance of being a gentleman, was to blunt their acuteness for physical research, or in after times to affect their reputation as men of genius.

"When men have begun to reason correctly (says Dr Hunter), and to exercise their own judgment upon their observations, there must be an end to delusions. Many doctrines of old physicians and of old women will meet with proper contempt; the tyranny of empty pomp and mystery of physic will be driven out of the land, and forced to seek shelter among less cultivated societies of men."

If the learned professions wish to be respected, let them respect each other: for our part, we esteem them all: and whatever assistance either they or others may afford to physiology, they may be assured that they will not find us anywise disposed to detract from its merit. Divested of prejudice, we value as highly the discovery of Priestley, which explains respiration, as if it had come from Albinus or Haller; and with as much readiness acknowledge obligations to the celebrated painter Leonardo da Vinci, as if he had been a doctor of physic. See ANATOMY, p. 667.

But while we are thus impartial to others, we would not be unjust to professional anatomists. Their learning, their patience, and ardour, have been great; and candour obliges us to assert their claim to the most numerous and important discoveries that have yet been made in physiological science. The pains which they have taken, the prejudices which they have surmounted, and those feelings which they have sacrificed in describing the parts of the dead body, place their labours beyond all praise.

But their discoveries have not been confined to a mere knowledge and description of parts. In the still fabric, just as in a time-piece or a broken orrery without motion, the whole presents a very confused and even an uninteresting appearance. In this case, should the man of reflection happen to ask, where are the organs of the different functions? all would be silence,

Preliminary observations.

26 Their labours and discoveries.

and

Preliminary observations.

and nothing would be found to make a reply to such an inquiry. The arterial system is relaxed and empty; the muscular fibre cannot be roused; the heart has ceased from its wonted beatings; and the nerve refuses to convey sensations. On this scene the eye of the anatomist could not be expected to dwell long with much satisfaction. Curiosity would induce him to look beyond it, and study the design. He would soon perceive, that to know the uses of the several parts, they must be seen alive and in action. But here new difficulties would arise, and feelings of compassion would exclaim against any farther pursuit. The natural zeal, however, of inquiry, the good of mankind, and the love of science in a generous mind, are not easily resisted.

To his lasting praise, and the singular improvement of true physiology, the anatomist has examined the living body, and has there observed, that all motion proceed immediately from the muscular fibre; that the muscular fibre again derives its power from the nerve, which terminates in the brain; that fibre, and nerve, and the whole system, are nourished by the blood which comes from the heart; and that the waste of blood is supplied by the lacteals, which absorb nutritious matter from the food as it passes along the intestinal canal.

He has also observed, that the blood, which is in continual motion, has a circular course; that other vessels along with the lacteals are employed to absorb; and by means of injection has shown the route of the different fluids as clearly in the dead as they could have been seen in the living subject.

When his eyes have failed in tracing objects that were too minute for unaided sight, he has called in the help of the microscope, and discovered the red globules of the blood, animalcules in the semen, and the anastomoses of the arteries and veins; and when the microscope could lead him no farther, he has had recourse to chemical analysis, and made discoveries equally important in demonstrating the bodies which compose the several fluids and the solids.

Besides these services which the anatomist has rendered to physiology, the science is likewise greatly indebted to him for those various and ingenious methods which he has taken to diffuse his knowledge. Whatever has occurred remarkable or rare, he has studied to preserve either dried or in fluids that resist putrefaction. By corroding the parts which he has injected in a certain acid, he has given an idea of the vascular system, which is at once instructive and elegant. Where it has been necessary to destroy the parts when incapable of preservation, or where the preservation would have been expensive, he has not neglected to represent them in models of wax, or to perpetuate them in accurate casts of lead or of stucco: and, lastly, that the valuable fruits of his labours might not be confined in his room of preparations or to his pupils, he has described most of them in drawings, has multiplied his drawings by correct engravings; he has even published his numerous engravings, and to render them intelligible, has illustrated each with copious explanations.

27
The views of the anatomist often too confined.

From this account it might be supposed that the anatomist has done all that can be reasonably expected from him. If we drew, however, such a conclusion, we might certainly be charged with precipitation. His views have hitherto been too confined, nor have they been directed with all that skill which a ra-

tional and comprehensive physiology would require. Preliminary observations. As if chiefly guided by the rant of the poet, that "the noblest study of mankind is man," he has cultivated his art principally with an eye to medicine and surgery; and while he has dissected the human body with a tedious minuteness, he has seldom looked into those of brutes but when he has wished to illustrate a theory or establish an hypothesis.

As some apology for such a conduct, there is indeed but little immediate or pecuniary advantage to be derived from comparative anatomy; and those who have heard of the fox and the grapes will readily perceive, that few will be disposed to commend a science which reflects not much credit on their knowledge, and which they are led from sentiments of pride to treat as either contemptible or useless. The decisive tone and affected air of superior discernment being not unusually a very tender part of the character, they often form that mark of distinction which is seldom resigned but with the utmost degree of reluctance. It is, however, allowed, that any opposition from these causes ought not to frighten an aspiring genius. His nobler mind should look beyond pecuniary prospects; and he ought to have fortitude enough to despise the sneers and malevolence of pompous ignorance. The other difficulties which he has to encounter in his own estimation may not be so small.

In seeking to enlarge the field of inquiry, he will soon experience that he wants a language, or at least a nomenclature fitted to express the different objects which must necessarily occur in his researches. He will find too that he wants those proper classifications of the animal kingdom, which are equally necessary both to abridge and direct his labours.

The first nomenclature of the anatomist was formed upon the dissection of brutes; and most of its terms, as the *rete mirabile*, are now useless, or tend to mislead those who employ them in their dissections of the human body. The few of its parts which still are retained, as the different names and divisions of the gut, are much more applicable to the usual appearances in certain quadrupeds, than to any thing which we meet with in man.

This first nomenclature declined with the studies which gave it birth, and with the decline of that superstition which permitted no other studies of the kind. Since the days of Vesalius the human body has been chiefly dissected; and the nomenclature which has thence arisen, and has since been assuming the form of a language, if adapted at all, is peculiarly adapted to that subject. Were we now therefore disposed to examine the internal economy of animals in general, we should see at once that the present nomenclature is as ill suited to comparative anatomy as the former nomenclature was to the dissection of the human body. The several facts which confirm this assertion are but too numerous. To give one or two: In a late work, *The Physiology of Fishes*, the celebrated author is obliged to inform his reader in a note, that when he makes use of the following terms, superior, inferior, anterior, and posterior, the fish is supposed to be standing erect in the attitude of man: and in his ingenious *Contemplation on Nature*, Bonnet, besides the absurd practice of calling nerve by the name of marrow, has been pleased to observe, that in certain insects the spinal marrow

28
Obstacles in the way of a more liberal study of anatomy.

29
The want of a nomenclature.

30
Origin of the anatomical nomenclature.

Preliminary observations.

31 Defects of the present nomenclature.

row is not in the spine, but in the opposite side of the body, running longitudinally along the breast.

Applying occasionally this nomenclature to the small number of birds and quadrupeds which we have dissected, it was much strained with respect to their skeletons. Even forced analogy could not bring it to express many distributions of the nerves and blood vessels; and when it was employed in naming the muscles, in most cases it turned out to be useless or absurd.

We were first led to observe its defects on hearing of the nameless bones of the pelvis, called the os ilium, the os ischium, and the os pubis, united behind by an os sacrum, which is tipped with a coccyx or bone of a cuckoo: we thought it likewise somewhat remarkable to find a goat, a boat, and a conch-shell, among the external parts of the ear; and within the tympanum a hammer and its shaft, a stithy, a stirrup, and a periwinkle. But these defects were most seriously felt in raising the different muscles of a dog, and comparing them severally with Albinus's tables. These tables and muscles, to our great surprise, did not reflect that mutual light upon one another which we expected. To obtain here more accurate ideas we got the comparative myography of Douglas. At one glance the etymological table of this work demonstrated the confusion and the imperfection of the nomenclature. In his, as in other books of myography, the muscles are explained by describing their origins, insertions, and uses: but the table shows, that their names are never, excepting only in a few cases, derived from any of these three circumstances, which in every description are uniformly noticed in all muscles. Their names on the contrary are frequently taken from their particular form and appearance in the human body, or from those circumstances which are constantly varying in every animal; just as if muscles of the same origin, insertion, and use, should in all animals have a similar colour, a similar mode of insertion and origin, a similar composition and variety of parts, a similar course and direction of fibres, a similar figure and shape, a similar passage through certain places, a similar proportion with respect to one another, or should be formed of a similar substance.

If we pass to the membranes, as expressed in this nomenclature, we shall not discover that their names are more philosophical. A periosteum covers the bones, a pericranium the skull; the cavity of the thorax is lined with a pleura, that of the abdomen with a peritoneum; and what is surely somewhat remarkable, bones which are hollow have a periosteum on their inside: the membranes in the skull are by way of distinction denominated *mothers*; the one which lies next to the cranium is the dura mater or hard-hearted mother, while that which immediately encwraps the brain is the mater pia or the affectionate mother.

Of all the terms, however, that occur, the cavity of the skull contains the most extraordinary collection: we there meet with a Turkish saddle and with the feet

of a sea-horse, with a ring, with a lyre, with a sickle, with a bridge, with a writing pen, and a wine-press. A few of these names belong to the substance of the brain itself: where one part is called from its hardness the callous body, another from some fancied analogy the medullary substance, and a third from being on the outside is named the corticle, and from its colour the cineritious. These are not all: there are besides footstalks of the cerebrum and cerebellum; the thighs and arms and fore and hind legs of a grand division, the medulla oblongata; there is also a vault and two or three pillars, one pair of striated bodies, two beds, and a couple of horns; some cavities which, from a supposed resemblance to stomachs, are called ventricles choroid coats; two bodies, named from the olive, two from a pyramid, and one from a rine, which is chiefly remarkable for having once been thought the residence of the soul. At some distance in the cerebellum we are however pleased to meet with a name that is somewhat elegant, the *tree of life*. In this there is a degree of refinement, which must strike one as it comes unexpectedly. The following names are in the lowest style of obscenity: they are wormlike and mammillary processes, they are nates, testes, an anus, and a vulva; which, in order to save the blushes of our readers, we shall leave in the language in which they were conceived. A singular part is placed immediately under a funnel, and is named from its use the pituitary gland; it was meant originally to secrete a phlegm, but it holds that office now as a sinecure (B).

Ridiculous and whimsical as many of these appellations are, they generally have some allusion to their subject, and are by no means the most exceptionable in this nomenclature. The names of discoverers which have been imposed upon various parts, contain no description at all; and the only purpose which they can serve is not to promote the interest of science, but to immortalize the anatomists. As many of those have not been more than insensible to fame, they or their friends have taken the freedom to introduce parts to our notice, not by telling us what is their nature, but by demonstrating who was the first that observed them. Upon reading therefore the catalogue of names that occur in anatomy, one would imagine that many of these ingenious dissectors had supposed themselves not the discoverers but the inventors of several parts in the animal economy. In our vascular system is the ring of Willis, the vein of Galen, and the large wine-press of Herophilus. We have in our brain the bridge of Varolius; and in our nerves we possess the property of various discoverers. The holes of Vidius, and the caverns of Highmore, are in our bones; some small muscles in the sole of our foot is the fleshy mass of Jacobus Sylvius; a part of our eye is the membrane of Ruysch; and in those cases where they are to be found, Couper lays claim to particular glands; two canals from our mouth to our ears are the tubes of Eustachius;

(B) That our readers may judge whether or not these names be fairly translated, we subjoin the originals here in a note. In the ear, *tragus, scapha, concha, malleus, incus, stapes, cochlea*: in the cavity of the skull, *fella Turcica, pedes hippocampi, annulus Willisii, psaloides vel lyra, falx dura matris, pons Varolii, calamus scriptorius, torcular Herophili, corpus callosum, substantia medullaris, substantia corticalis vel cinerea, pedunculi cerebri et cerebelli, femora, brachia, crura anteriora et posteriora medullae oblongatae, fornix, corpora striata, thalami nervorum opticorum, cornua nervorum opticorum, corpora olivaria, corpora pyramidalia, glandula pinealis, arbor vitae, tubercula mamillaria, appendices vermiformes.*

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* *Morsus diaboli.*

³²
The persons most apt to perceive these defects.

chius; the duct of our pancreas is the right of Vir-fungus; Poupart has a ligament almost in our groin; a lobe of our liver belongs to Spigelius; and the female would certainly stare at being told, that among the distinguishing marks of her sex are the tubes of Fallopius, a tench's mouth, and several vestiges of the devil's teeth*.

The man who will readily observe the defects of this nomenclature is not he who has learned it already, and who no longer is acquiring his ideas through its imperfect and confused medium; nor is it he whose studies are confined to the human body, the particular subject on which it was formed: He who will sensibly feel its inconvenience is the young anatomist, who must receive his knowledge through its channel, commit its vocables to his memory, and use them afterwards in recalling his ideas. Another who must soon perceive its failings, is he who engages in comparative anatomy, and who is anxious to extend his views beyond that which the foolish indolence of conceited bombast has called the *microcosm*. A third will be he who has remarked the numerous synonymes which different authors have thought themselves warranted to substitute in place of the old terms: for these repeated attempts at amendment are a strong proof of that estimation in which it is held by the anatomical writers in general: And, lastly, that man cannot hesitate long to pass upon it a condemnatory sentence, who, like Wilkins, Locke, Condillac, and Reid, is a person of extensive and profound reflection, who is well acquainted with the intimate connection between accurate expressions and accurate ideas; who knows how much the improvements of language are able to facilitate the progress of science; or who has experienced the wondrous effects that have already resulted from the example and labours of Linnæus, and particularly from the new nomenclature in chemistry, which can hardly be too much valued and admired.

³³
Hints respecting a new nomenclature.

Our intention here is not to suggest a particular plan for any new anatomical nomenclature: the state of our knowledge may in this respect be yet too imperfect, and perhaps it may be necessary to see more of the animal economy, before we should venture on such an undertaking. We may however, in general, observe, that this nomenclature, like the languages of nations, ought not to be formed with any view to an individual, a species, or genus; and after that be carelessly extended by fanciful analogies to new objects, and from these again be extended to others; thus making metaphor to spring out of metaphor without end, until the original figure be lost, and revived and lost again, times without number. It ought to contain as many as possible of those terms which, understood in their primary sense, might apply to the whole animal kingdom and living bodies, without any metaphorical expressions, if, in describing the tastes and colours, such expressions can be avoided. Instead of the words anterior, posterior, inferior, and superior, which are perpetually shifting their meaning with a change of attitude, it ought to have words of one constant invariable import, expressing the regions of the head and the back and their two opposites. These terms, with right and left, would be found in anatomy to answer nearly the same purpose that the degrees of longitude and latitude, or the points of the compass, do in geo-

graphy. Every part would then be considered as lying within or as pointing to fix different regions, the right, the left, the head, the back, and their two opposites. If more particular descriptions were wanted, the definitive terms might then be taken from the more immediately surrounding parts; thus giving an account of the ethmoid bone, D'Azyr borrows the definitive words from the regions of the cranium, the scapular, basilar, facial, and occipital; or from the regions in immediate contact, the cerebral, palatine, nasal, and sphenoidal.

If an object attainable, this nomenclature too should be derived from one origin, and not like the present be a wild incoherent Babylonish gibberish of a number of mixtures. It ought to aim at conveying its ideas with clearness and precision, and yet fully, concisely, and promptly. In point of simplicity it ought to study the ease of the memory in receiving, retaining, and in recollecting. To prevent a needless multiplicity of terms, it ought to avoid puerile minutiae, which serve no end but to render description tedious and confused; it ought to avoid such trivial divisions, as those of the gut into duodenum, jejunum, ileum; or those of the artery into subclavian, axillary, brachial; and, lastly, it ought to be formed on a plan containing certain rules of construction for giving names not only to parts already discovered, but to those parts which are still unknown, or which distinguish individual and species.

In imposing names, it might perhaps be of some advantage to examine not only together, but separately, the great constituent parts of the system; as the bones, the ligaments, the cartilages, the muscles, the membranes, and the glands; the nervous, the sanguiferous, and absorbent systems; and all these with their properties and uses perspicuously arranged. How far a regularity in composition, and a uniform variety of terminations, might be of use in this nomenclature, can best be conjectured from their great importance in the new philosophical language of chemistry.

It has been observed, that such a nomenclature, to encourage and assist the comparative anatomist, is still wanting; and it also was remarked, that we yet are unacquainted with proper classifications of animals, peculiarly fitted to direct and abridge the anatomist's labour, and to satisfy the inquiries of the physiologist.

Our present physiological arrangements are, like our present nomenclature, principally suited to the human body. To take our instance from the celebrated Haller, he begins his *Outlines* with the simple fibre, and the cellular texture, of which he is anxious to compose as many of the solids as he can. He then proceeds to more of the organs, describing with great erudition and care their different uses and structure in man. These organs, however, which he describes, and those analogous with respect to their structure, are confined to a part of the animal creation. As different classes of the animal kingdom have with similar functions varieties of organs, and as one function is consequently performed in different ways, it is evident that organs ought not to form the general divisions in any physiological system of arrangement, because we should then have a new arrangement for every new species of organs. Of this truth Haller and others have not been ignorant. They have also divided their subject into functions;

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³⁴
The present physiological arrangements are too confined.

³⁵
Two kinds of arrangement, according to the functions, or according to their organs.

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functions; but still they are functions in the manner performed by the human body. This body has engrossed so much of physiology, that we often see the functions explained with scarcely any allusion to their organs; as these are supposed to be always the same, and already known from the usual dissections.

36
Haller's physiology refers chiefly to the human body.

Haller's physiology is professedly that of the human body. His conduct here was seemingly the effect of general custom: it did not arise from any contempt of comparative anatomy. There have been few who esteemed it so highly, who have studied it more, or applied it so skilfully. He declares there are many parts of our bodies whose functions can never be fully explained, unless we examine their structure in quadrupeds, in birds, in fishes, and even in insects; though he therefore had dissected of human subjects to the number of 350, yet the number which he dissected of brutes, and, what is more, dissected alive, was much greater. Numerous, however, as were his dissections, they were too confined for general physiology. That requires a range more extensive; and, to shorten the labour, different classifications of animals from any of those to be usually met with. This assertion hardly needs a proof.

37
Zoological and physiological arrangement.

There is nothing more certain, than that were the anatomist to dissect animals as they occur in the system of Linnæus, or any other naturalist, his toil would be immense, and the knowledge which he thence would acquire of functions would scarcely be found to bear to it even the smallest proportion. By this observation we mean not to object to those ingenious classifications which Linnæus and others have employed to facilitate the study of zoology. All their classifications may be useful; and many display that extent and clearness of comprehension, that distinguishing acuteness, and that laudable ardour for the interest of science, which ought to render their authors immortal, and intitle them to the gratitude of future ages. Yet these systems are formed with a view different from that which principally ought to direct the physiologist. They were meant to contain a full enumeration of the objects of zoology so far as known; to exhibit them arranged in different classes and subordinate divisions, according to such obvious and distinct marks as might strike at a glance, or appear on a cursory examination. To him who is entering on the study of zoology, they show at once the extent of his subject; they elevate his mind by the grandeur of the prospect; and when better employed than in pleasing the fancy or in rousing the rapturous feelings of a poet, they draw his attention to those significant and marked signs in which the language of nature is written. They assist his judgment in the art of arrangement, and give to his memory a power of recollection which it had

not before. To the natural historian they perform a service equally important, if not essential, to his undertaking: to him they supply the place of chronology; and instruct his readers by the chain of connection which they give to his thoughts, and by that perspicuity which they invariably bestow on his language.

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These arrangements, however, with all their advantages, are not the arrangements which the physiologist would wish the anatomist to observe in his dissections. They are certainly useful in studying the manners, dispositions, and habits of different animals, and all that part of the outward economy which indicates something of their wisdom and design. But they little illustrate that internal structure on which this outward economy is founded, or tend to explain the more secret functions which, not depending on the will of the creature, only display the power and omniscience of him who made it. This consequence is easily conceived, from considering the difference between zoology and what has been here defined physiology. Zoology is chiefly led to examine the animal kingdom as it usually presents itself to the eye, including a great variety of objects; physiology only that single part of the animal economy which is chiefly made known by anatomy and chemistry. Zoology has been wont to divide its kingdom into so many classes or orders of animals; physiology would naturally divide its economy into so many functions. Zoology has subdivided its classes by certain obvious and exterior marks, as the teeth and the claws; physiology would naturally subdivide its functions by the many varieties of those organs which are destined to perform them, as the different kinds of lungs and of stomachs. Zoology but cursorily mentions the functions as forming a part of the history of animals; physiology takes notice of animals only when they are of use to illustrate its functions. From this comparison it will readily appear, that things which are primary in a zoological will often be secondary in a physiological species of arrangement; and that things which are primary in a physiological will often be no more than secondary objects in a zoological. This is very conspicuously the case in one of the grand divisions of Linnæus into mammalia, where the important secretory organs of the milky fluid are noticed only, like the colour of hair or the length of a tail, as a good outward mark of distinction; and likewise in the excellent table of D'Aubenton, where the function of digestion is not even alluded to at all; although he had complained that there was more of art than of nature in the common arrangements, that classification by outward marks had confounded things of a different structure, and that the lesser divisions should be made only by marks relating to the functions.

38
Difference between them.

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observations.39
Dauben-
ton's ar-
rangement.

A N I M A L S.																
With a Head.					The most part without a Head.											
Noftrils.					Without Noftrils.											
Ears.					Without Ears.											
Two Ventricles in the Heart.					The Heart variously formed or unknown.											
Warm Blood.					A whitish Fluid instead of Blood.											
Inspiration and Expiration of the Air at short Intervals.					Inspiration and Expiration of the Air at long Intervals.		Admission of Air by Gills.		Admission of the Air by Spiracula.		No apparent Entrance to admit air.					
Viviparous.					Oviparous.											
With Teats.					Without Teats.											
1 st Order. QUADRUPEDS.		2 ^d Order. CETACEOUS ANI- MALS.		3 ^d Order. BIRDS.		4 th Order. OVIPAROUS QUA- DRUPEDS.		5 th Order. SERPENTS.		6 th Order. FISHES.		7 th Order. INSECTS.		8 th Order. WORMS.		
Four Feet and hairy Skin.		Fins and no Hair.		Feathers.		Four Feet and no Hair.		Scales without Feet or Fins.		Scales with Fins.		Antennæ.		Neither Feet nor Scales.		
															Preliminary observations.	

Preliminary
observations.

Preliminary observations.

It is plain from this table, and from what we have mentioned concerning Haller, that it would be injustice to anatomists and naturalists to say they have never paid any attention to the physiological modes of arrangements. It can only be said that they have not paid to them all that attention which they deserve; and that no general physiological system of arrangement, excepting D'Azyr's, has, so far as we know, been yet attempted.

40
Whence materials might be collected for a physiological arrangement.

How such an arrangement ought to be made is easily described, though by no means very easily executed. It needs not a proof that functions should form its primary divisions; that its subdivisions should be the varieties of these functions; that the whole should be both distinguished and explained by the kinds and varieties of those organs, by which they are performed; that the descriptions of these organs might partly be collected from the several works of natural historians and comparative anatomists, as from the dissections of the French academy, from numerous fragments of the *Curieux de la Nature*, from the collections of Blasius and Vallentini, from the writings of Haller, from the works of the celebrated Hunters and Monros, from the publications of Hewson and Cruikshank, and those who have lately been making discoveries in the system

of absorbents. D'Azyr has mentioned a great many more. He particularly recommends Perrault, Du Verney, Collins, and D'Aubenton, on Birds and Quadrupeds; Charas, Roefel, and Fontana, on Reptiles; Ray and Willoughby, Artedi, the Gouans, and Broussonet, on Fishes; Swammerdam, Malpighi, and Reaumur, the Geoffroys, Bonnet, and Lyonnet, on Insects; and, lastly, the curious researches of Willis, Ellis, and Donati; of Trembley, Baker, Baister, and Boadisch; of Forskal, of Adanson, of Muller, Pallas, Spalanzani, and Diquemare, concerning Worms, Zoophytes, and Polypes. Where any errors are to be corrected, or where any deficiencies are to be supplied, it is needless for us to observe that recourse must be had to new examinations and to new dissections, where it may be of some use to attend to the foods of animals, to their places of abode, and their modes of life, as circumstances leading to some internal varieties of structure. To the list of authors we might have added Campfer on Fishes; and we should not forget the excellent writings of D'Azyr himself, whose table of physiological arrangement is a work of merit that bespeaks reflection, ingenuity, and labour, and which follows here, with only a small variation in form.

Preliminary observations.

41
D'Azyr's arrangement.

A TABLE of the FUNCTIONS or PROPERTIES of LIVING BODIES.

- | | | |
|-----------------|------------------|------------------|
| 1. DIGESTION. | 4. RESPIRATION. | 7. GENERATION. |
| 2. NUTRITION. | 5. SECRETION. | 8. IRRITABILITY. |
| 3. CIRCULATION. | 6. OSSIFICATION. | 9. SENSIBILITY. |

Every body in which one or more of these functions are observed is to be considered as possessing organization and life.

1 DIGESTION.	Living Bodies	Which have	One or more stomachs, easily distinguishable from the œsophagus and intestinal canal, A stomach distinguishable only by certain expansions from the œsophagus and intestinal canal, An alimentary canal, not distinguishable into œsophagus, stomach, and intestines, Neither stomach nor intestines,	Man. Quadrupeds. Cetaceous animals. Birds. Crustaceous animals. Oviparous quadrupeds. Serpents. Cartilaginous fishes. Fishes properly so called. Insects. Worms. Zoophytes. Plants.
2 NUTRITION.	Living Bodies	Whose nutritious juices are absorbed	By vessels beginning from internal cavities, By vessels opening upon the external surface,	Man. Quadrupeds. Cetaceous animals. Birds. Oviparous quadrupeds. Serpents. Cartilaginous fishes. Fishes properly so called. Insects. Crustaceous animals. Worms. Plants.

3
CIRCULATION.

Living Bodies

With blood

Having a heart with two ventricles and two auricles,

With one ventricle divided into several cavities and two auricles,

With one ventricle and one auricle,

With juices

Whose heart is formed of one longitudinal vessel, tuberos and contractile, in which there is a whitish fluid instead of blood,

In which no heart has been yet observed, but only vessels filled with juices of a nature different from that of blood,

Man.
 Quadrupeds.
 Cetaceous animals.
 Birds.
 Oviparous quadrupeds.
 Serpents.
 Cartilaginous fishes.
 Fishes properly so called.

Crustaceous animals.
 Insects.
 Worms.
 In some crustaceous animals there is observed something resembling a heart.

Zoophytes.
 Plants.

4
RESPIRATION.

Living Bodies

Which respire

By lungs free from all adhesion, and spongy,

By lungs free from all adhesion, vesicular, and muscular,

By lungs adhering to the ribs, and provided with appendages,

By gills of different forms,

By stigmata or holes in different rings,

By an opening called trachea, or by external fringes,

By tracheæ,

In which there have been discovered neither stigmata nor tracheæ,

Man.
 Quadrupeds.
 Cetaceous animals.
 Oviparous quadrupeds.
 Serpents.

Birds.
 Cartilaginous fishes.
 Fishes properly so called.
 Crustaceous animals.

Insects.
 Earth worms.

Aquatic worms.

Plants.

Polypes.

5
SECRETION.

Living Bodies

There are no bodies in which secretions are not carried on.

6
OSIFICATION.

Living Bodies

Whose skeleton is

Internal and osseous,

Internal and cartilaginous,

External and corneous,

External and cretaceous,

External and ligneous,

Which have no skeleton,

Man.
 Quadrupeds.
 Cetaceous animals.
 Birds.
 Oviparous quadrupeds.
 Serpents.
 Fishes properly so called.

Cartilaginous fishes.

Perfect insects.

Lithophytes.

Crustaceous animals.

Shell-fish.

Madrepores.

The greatest part of Zoophytes.

Plants.

Insects in their first state.

Worms.

Polypes.

Preliminary observations.

Preliminary observations.

7
GENERATION.

Living Bodies

Which are

Viviparous,

Oviparous, whether the evolution of the eggs takes place within or without the female,

Which propagate by slips,

Man.
Quadrupeds.
Cetaceous animals.
Birds.
Oviparous quadrupeds.
Serpents.
Cartilaginous fishes.
Fishes properly so called.
Insects.
Crustaceous animals.
Worms.
Plants.
Worms.
Polypes.
Plants.

8
IRRITABILITY.

Living Bodies

Which have

A body muscular or contractile,

Muscles covering the skeleton,

A skeleton covering the muscles,

No muscular power ; no spontaneous movements,

Greatest part of insects in the first state of their transformation.
Worms.
Polypes.
Man.
Quadrupeds.
Cetaceous animals.
Birds.
Oviparous quadrupeds.
Serpents.
Cartilaginous fishes.
Fishes properly so called.
Perfect insects.
Crustaceous animals.
Plants.

9
SENSIBILITY.

Living Bodies

Which have

Nerves and brain easily distinguishable from the spinal marrow,

Nerves and brain scarcely distinguishable from the spinal marrow,

In which there have not yet been discovered nerves or brain, or spinal marrow,

Man.
Quadrupeds.
Cetaceous animals.
Birds.
Oviparous quadrupeds.
Serpents.
Cartilaginous fishes.
Fishes properly so called.
Insects.
Crustaceous animals.
Worms.
Zoophytes.
Plants.

The above table, which has its divisions marked by the functions, and their kinds and varieties by the kinds and varieties of those organs by which they are performed, differs considerably from a zoological. Borrowing its several marks of distinction from internal characters, it more clearly demonstrates the difference between the mineral, vegetable, and animal, than any system that attempts to arrange by outward appearances.

42
Difference between mineral, vegetable, and animal.

No minerals, whatever be their forms or the regularity and beauty of their figures, were ever said to possess any thing like organs of nutrition ; and however frequently some may recover their lost shapes, they are never supposed either to produce, or assist in producing, their own kind by generative powers. And no plants, however much may be said of animals that want a nervous system and a heart, and are

fixed, without the power of locomotion, to one place ; we say no plants, though some may represent a few of the simpler effects of sensation, and others may be free to float through the ocean, were ever said to discover any signs of voracity, to possess any thing resembling a stomach, to distend their body by swallowing their food, to apply their food to the mouths of absorbents opening internally ; and when the nutritious juices were extracted, to eject it *in cumulo*. It has been said that zoophytes present similar phenomena. But what are zoophytes ? One half of their name would imply that they are animals, and another half would insinuate that they are plants. D'Aubenton reasons with clearness on this subject. True, says he, the greatest part of them are branched like plants, and like plants are composed of concentric circles. Some have a soft exterior substance which is called bark, and a hard interior which

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observations.

which is called wood. Along their branches, and at their extremities, they put forth vesicles which resemble buds; and when a part falls from the whole, it is sufficient, like a vegetable slip, to produce a zoophyte: but do these appearances prove that they are plants?

If ramifications constitute a plant, then many crystallizations will be plants; the shootings of frost on our windows will be plants; the silver tree of Diana a plant; our veins will be plants, our arteries plants; and our very feet which ramify into toes, and our hands into fingers, will have some title to be called plants. The truth is, ramification is not universal in the vegetable kingdom; and although it be general, it is no more peculiar to plants, than swimming is to fishes or flying to birds. If concentric circles constitute a plant, some bones of animals will then be plants, and some minerals must also be plants. The wood and the bark are only two metaphorical expressions, which with equal propriety might have been used of the bone and periosteum. But once suppose the zoophyte a plant, it was natural to carry on the analogy, and certainly necessary to have it provided with wood and bark; though it must be allowed that a corneous substance is not what we commonly mean by bark, nor an evidently hard calcareous substance what we mean by wood. The small vesicles, except in appearance, have no similarity to buds or fruits: they are the residences of small polypes, to whom the whole structure has been owing, by whom the whole either is now or has been inhabited, and to whom it answers the same purpose as the shell does to testaceous animals.

43
Difference
between living
bodies and machines.

After thus endeavouring to point out the boundaries between the mineral, the plant, and the animal (A), before we begin to treat of the functions, we must also take notice of another distinction; the want of which has occasioned much unnecessary trouble, and has given rise to not a few ridiculous disputes. This is the distinction between living bodies and some ingenious contrivances of art, which are called machines. It has not been asserted that any machine can either grow or propagate its kind; that it can assimilate the particles of matter that come in contact; that it is able to repair the injuries which it may suffer; that it can accommodate itself to circumstances, can create heat when the cold is keen, or cold when the heat becomes too violent: yet it has been supposed, from established prejudices, and from the successive evolution of parts in plants and in animals, that there is an analogy between a machine and a living body. The living body has been called a machine; and notwithstanding the acknowledged truth of that observation so often repeated since the days of Hippocrates, That the whole is a circle, that nothing is first and nothing last in the

animal economy, we are still talking as if living bodies were nought but machines; we are still reasoning as if their parts had existed in succession, had acted in succession, were combined in succession; we are still seeking for what is prior and what is posterior, for what is derived and what is original in point of structure, as if we were examining a work of art; we speak gravely of the viscera, of the thorax deriving a coat from the membranous pleura, the abdominal viscera from the peritoneum, and the branches of nerves deriving a pair from the dura and pia mater of the head; we argue with people who maintain that fasciæ are nervous expansions, and the muscles themselves but nervous productions: and although we be hardly able to conceive how the brain could be nourished without blood thrown from the heart, or the heart move without the assistance of nerves from the brain, we are still disputing about which was prior and which was posterior in point of existence; a dispute that will probably terminate as soon as that of the ancients, whether the first eggs were from birds, or the first birds were hatched out of eggs.

44
The vital
organs
seemingly
coeval in
point of
existence.

These dark and inscrutable mysteries of nature we presume not to explain: they point out almost the creative hand, and bring us almost into the immediate presence of that Being by whom we live, move, and exist; and before whom the truly feeling and elevated mind is less disposed to examine than adore. We are only to observe, that from this coeval formation of parts which the microscopic part of anatomy has often distinguished from their evolutions, and from this mutual dependance of organs one on another, we are left at freedom to begin at any part of the circle, and treat of the general properties and functions of living bodies.

45
Functions
form a circle.

We now venture on a rude sketch of the order and manner in which these properties may be explained, and in which the facts in general physiology may be afterwards arranged. Another opportunity may produce something more full and correct. In the present sketch, many imperfections will no doubt be found; we already are able to foresee many from our own inability to treat the subject according to its merit. And perhaps the reader, who is possessed of temper and candour, will impute some to the newness of the plan, and the present infant state of the science.

Without blaming the arrangement of d'Azyr, whose genius and labours we shall always respect, we have been induced to adopt the following, from those reasons with which the reader is now to be acquainted.

Attending minutely to a living body, which already has escaped from the seed, the egg, or membranes of the parent, which is wholly disengaged from the placenta,

(A) It is curious to observe how careless we are in annexing precise ideas to our words. Bonnet supposes that in some world more perfect than ours, the rocks may be organized, plants may feel, brutes may reason, and men may be angels. In this passage the form was all that seems to have entered into his idea of the man and the brute; and so new was his notion of a perfect world, that one who believed in the metempsychosis, would naturally imagine that he here had been fancying a state for the damned, where angry Heaven was to fetter the angel in the form of a man, a man in that of a brute, a brute in that of a vegetable, and a vegetable in that of an uncouth rock. How much to be pitied would the creatures be that reasoned and felt, and were at the same time more incapable of moving than an oyster or a limpet!

Preliminary observations.

46 The arrangement of functions in this article.

placenta, and depends for the future on the operations of its own organs (B), we may observe, that in order to live, it must be allowed the free use of air, as applied by the organs of—*Respiration*.

That, in order to grow, it must have likewise a supply of food, which is a substance somehow adapted to its constitution; and which, on being received into the system, is

Prepared by—*Digestion*,

Taken up by—*Absorption*,

Distributed by—*Circulation*,

Affimilated by—*Nutrition*,

And the whole carried on by means of—*Secretion*.

We next may observe, that in order to enjoy the free exercise of these functions, it must be secured from the more common and external injuries of its situation; and that this is done by certain integuments originally produced, and when it is necessary, afterwards renewed by that function; which, till we receive a new nomenclature, we shall venture to call by what may be rather an uncouth word—*Integumentation*.

We again may perceive, that these functions are all dependant on a general principle—*Irritability*:

By which the system is rendered by stimulants susceptible of—*Motion*;

Accommodates itself to different circumstances by means of—*Habit*;

Alters its shape by successive—*Transformation*;

Produces the species by—*Generation*;

And when the business of life is finished, is, after many a languid affection from the influence of—*Sleep*,

At last subjected to the general fate of all living bodies—*Death*.

These we imagine are the general properties of living bodies; and such is the order in which we are now to take a short and cursory view of them.

SECT. I. *Respiration*

Is that function by which air is brought into

the system, and by which it is prepared in particular organs, that in some respect succeed the placenta in the general economy. For as any interruption of the usual intercourse between the placenta and foetus in ovo proves soon fatal, so when that communication naturally ceases, and the new one succeeds between the lungs and external air, it is likewise found, that any preternatural interruption of this last is in all living bodies presently attended with various symptoms of increasing languor, and in many with an almost instantaneous death.

So essential is respiration to the system, that snails, chameleons, and some other animals, can live for years upon air alone. We have seen a chameleon that lived and was vigorous for twenty two months without any food, and which might have continued to live much longer but for an unfortunate bruise by a fall.

Other phenomena equally demonstrate the importance of air to the living body. The frog leaps away wanting its heart; it survives the loss of the greatest part of its spinal marrow. Without its head, it lives for some days, and its heart continues to circulate its blood (c). Spalanzani took one from the back of a female, cut off his head, and after performing this whimsical experiment, saw the gallant return to his mistress, grasp her in his arms, and finish the task which he had begun: And Borelli found, that eels and serpents, though their bodies be opened, and the whole of their viscera be taken out, are able to move for a day after; and yet notwithstanding, in all these animals, the life is observed to be suddenly extinguished when the all-vivifying air is excluded. Even the smallest insect has died, and the plant lost its vegetative power, when retained for any while in a vacuum. The fish itself, when placed under the exhausted receiver, has started anxiously to the surface of the water in quest of fresh air; and finding none, has sunk to the bottom and expired in convulsions.

If

(a) To give a general view of the manner in which living bodies are nourished and supported in the egg and uterus, and before they begin to depend entirely on their own organs, we have subjoined a plate (see Plate CCCXCI.), representing embryos of various kinds. The three first figures are from Swammerdam: the first is the membrane containing the insect, the second the membrane after the escape of the insect, the third is the insect itself, fed by absorbents, opening on different parts of the body.

The fourth, fifth, and sixth figures, are from Grew: the fourth is a bean, spreading its seminal roots into the lobes. In the fifth and sixth the lobes of the seed are seen converted into seminal leaves.

The seventh to the twelfth represent the transformations of the chick in ovo: the first of these figures is from Aquapendens; the rest are from Blasius, who got them from Malpighi.

The remaining figures are all from Aquapendens: the two last represent a fish that is sometimes oviparous and sometimes viviparous.

Plants and animals are here observed spreading their roots in a similar manner. The proper proportions are overlooked, not being necessary to convey the idea which is here intended.

(c) "Two days (says Dr Monro) after cutting off the head of a frog at its joining with the first vertebra, I found it sitting with its legs drawn up in their usual posture; and when its toes were hurt, it jumped with very considerable force. Its heart likewise continued to beat about forty times in a minute, and so strongly as to empty itself and circulate the blood.

"In several frogs, after cutting off the back part of the six undermost true vertebræ, I took out all that part of the spinal marrow with the cauda equina which they cover. The lower extremities were rendered insensible to common injuries, and lay motionless: yet the frogs lived several months thereafter, and the wounded parts of their backs cicatrised, and the bones of their legs which I fractured were reunited, the blood circulating freely in their vessels." *Experiments on the Nervous System*, made chiefly with the view of determining the nature and effects of animal electricity.

Respira-
tion.

If objections should be made to these trials performed in a vacuum, if it should be said that under the receiver the shrivelled fruit swells and turns plump, that the body of the frog is strangely inflated, that its turgid eyes grow prominent in its head, and that thin phials corked full of air are broke by its expansion; still there are facts which do not admit of the like equivocal interpretation. All living bodies will die in the air which they have respired; and when ice covers the whole of the water, many of the fishes are known to perish; or if an opening be made in the ice, to hasten to the air, and rather than retire, quietly suffer themselves to be caught.

491
Seeming
exceptions

To this general dependance of life upon respiration, there occur but few things like an exception: these are some serpents and worms and crustaceous animals found alive in the hearts of stones, some insects that were found in wood, and a number of toads which in different places have been taken from the hearts of trees and of rocks, where they left an impression, and where they were supposed in some cases to have lived for centuries without air. These facts, real or pretended, have been the cause of much speculation. Some philosophers, who imagine that nature is always obliged to act agreeably to those ideas which they have already formed of her laws, are, notwithstanding the high authorities by which some of these facts are attested, disposed to doubt them. General analogy, which regularly opposes singular phenomena, is upon their side; and without her concurrence, they will grant existence to no living body that will not submit to the old established modes of respiration. Others again, who would not presume to dictate for nature, who have long experienced that she is not forward to obtrude her secrets, and who can believe that she may have still some to communicate, consider these facts as something new which she means to impart; and as one of the instances where she seems to deviate from general analogy in adhering to her grand accommodating principle by which she fits every living body for a certain range of varying circumstances.

50
Animals in-
closed in
stones, &c.51
Opinions on
this subject.

These last, receiving the facts as sufficiently authenticated, have studied only how to account for them. When stones therefore were thought coeval with the world itself, they supposed their toads to have sprung from the ova that were scattered through the earth at its first formation; they did not recollect, that if the earth must have existed before these ova could have been sown, and that if the stones were coeval with the earth, the ova could not have entered their substance. When they afterwards learned that the consolidation of stones is an operation still carried on in the mineral kingdom, they acknowledged their ova to be less ancient, but did not perceive that all these ova involved suppositions that cannot be admitted by sound reason. For how was an ovum to grow without air and without food? and how particularly was it to grow with such a force as to make an impression in a solid rock? This would imply a power of expansion scarcely to be equalled by gun-powder, and which we ought not to be rash in ascribing to the nutritive effects of abstinence and nothing. Were it not for the toad, the expansion itself might have found a solution in a theory of the Earth, which has cast all its stones in a foundery under

the water, where the moisture might have rendered them apt to be formed with numerous cavities.

Respira-
tion.

Perhaps the way to remove these difficulties concerning the toad, would be to ascertain its mode of existence in the heart of the stone. Suspecting that the air communicated somehow with the solitary cell, we procured a toad that was crawling out from its den in the evening. It was put into a glass just large enough to hold it with ease. The mouth of the glass was filled with cork sufficiently close to retain water; the glass was then laid on its side, and the animal respired for several days without discovering signs of uneasiness: but supposing that air might still be admitted, the cork received a covering of wax, and the animal died ten hours after.

From this experiment, and the fate of toads when put under an exhausted receiver, from an air passage in the crust of chrysalids, from the porous texture of the white speck, or the opening which the snail leaves in the membrane that is spread over the mouth of its shell, we were led to think on d'Aubenton's remark, that the inclosed toads might have breathed, and that the wood has been always cleft, and the stone broken, before it was shown how the external air was excluded †.

On farther reflection, our own experiment appeared inconclusive; and d'Aubenton's remark, after close examination, seemed not entitled to much attention. He would have it supposed that a toad is lurking in every block of stone and of wood; and on this supposition would have an inquiry to be regularly made, whether or not there be any communication between this supposed animal and air; because, when the stone or wood is in fragments, the attempt to disprove such communication is in his opinion impossible.

† Encyclo-
pædie Metho-
dique, tom.
2. partie 2.
p. 610.

But are we certain that the admission of external air would remove the difficulty? We are not so positive now as we were upon this subject. In the summer months, we recollect to have drowned frogs which were living in the fields, by keeping them some hours under water: but if we allowed them to rise to the surface, and respire at pleasure, they became at last so accustomed to that element, that if the temperature was not much above that of spring-water, they lay in the bottom not only for days but for weeks together.

In the winter season, it is well known that frogs are sometimes discovered in clusters below stones and under water in the neighbourhood of springs; and often seen in the bottom of ponds, marshes, and ditches, where water is collected, and the whole surface covered with ice. In this situation, we have frequently examined their sides and their nostrils, and can venture to assert, that they did not respire in the same manner that they did when on land: for the moment that this animal is put under water, the palpitating motions of its sides and its nostrils are observed to cease; and Chaptal has seen them suspending respiration as it were at pleasure even when in air ‡.

While they move, however, and exhibit indications of active life, we would not say that air is excluded. In the roots of plants, in aquatic worms, in polypes, and in the placenta itself, the same organs seem to perform the double office of lungs and absorbents. When

under



Respira-
tion.

52
Some
things re-
lating to
frogs and
toads.

under water, what are the functions of these organs in frogs and in toads? It is not disputed that in moist places they can live longest without food; and some phenomena which have been observed relating to this subject appeared to us not unworthy of attention. In the beginning of the summer 1793, while we were making a few experiments on the nervous influence with some metals, a frog was taken out of the water in the dusk of the evening, and put into a deep and wide-mouthed glass till next morning: but next morning a quantity of water was found in the glass, the animal was dead, its mouth full of foam, and the greater part of its body covered with froth. The following autumn a boy came with a couple of toads wrapt up in tow. Till we had leisure to make our experiments, they were allowed to remain as they were for three days in the corner of a room. When taken out, their colour was pale, their bodies much swelled, and a quantity of water collected between the skin and the muscles. When held in the hand with their head upwards, the water was evacuated downwards by the anus. It was one of these toads that afterwards died when confined in the glass without air. Its body was put into a solution of madder for two days; and when the skin and muscles were removed, the bones, which are still preserved, were found red. A live frog in the same solution, though allowed to breathe, expired in a few hours. In three days its bones became of the red colour, but not so deep as that of the toad's. Another frog died in the solution; but the bones, from age or some other cause, did not receive the colour of the madder. In all cases the skins were found red.

53
Different
functions
of their ab-
sorbents.

As we know not how far the great accommodating principle of nature may be extended, perhaps the absorbents opening externally may in these animals sometimes supply the place of the lungs, as the lungs supplied the place of the gills which they used when tadpoles, and as the gills had formerly supplied the place of a placenta, or the primary absorbents, through which they derived their nourishment in ovo.

54
What sorts
of stones in-
close ani-
mals, and
what sort
of animals
are inclosed.

Those stones which inclose animals are known to be such as have gradually assumed the solid form, and those animals which have been inclosed are known to be such as in other cases have been subjected to the torpid state: But this state has not been examined with all the attention which it deserves. From this state, Bonnatere says, in his introduction to Ereptology*, that it is impossible to rouse the animal by the loudest noise, the rudest shock, or the deepest wound; the internal motion is just sufficient to preserve the system from that decomposition to which animal substances are exposed. It retains only the form of what it was. It appears neither to live nor to grow; and the whole mass, if what is exposed to the air be excepted, is not sensibly altered while the torpor continues. All the senses are shut up; all their functions are entirely suspended: digestion is no longer in the stomach; all respiration has apparently ceased; and it has been doubted whether or not this function be in some cases at all retained. When the genial warmth, however, returns, in fix, in

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eight, or in ten months, according to that variety of climates between the frigid poles and the tropics, the animal revives. But the question is, if the first circumstances in which the animal became torpid had been artificially or naturally continued, how long in this way might the different functions of life have been suspended; and how far are we warranted by the analogy of seeds and of eggs to lengthen this period of their existence, without supposing a decomposition or destruction of organs?

Experiments must tell what are the limits which nature has here prescribed to herself. New eggs, when covered with varnish, or placed under the exhausted receiver, are secured against the attacks of corruption. Bomare, in his Dictionary, has mentioned three, which, protected from air, were found fresh in the wall of a church after a period of 300 years (D).—And if it be true that a snake found in a block of marble died as soon as exposed to the air, or if the parts in contact with air be the only ones which in torpid animals appear to be changed, it would seem probable that a total exclusion of this varying and active element would tend more to the preservation of torpid animals, in certain instances, than a free admission, which, in those cases where all vital functions have ceased, is regularly found a principal agent in their dissolution.

M. Herissant of the French Academy was the first philosopher who, by means of experiment, thought of interrogating nature herself upon this subject. On the 21st of February 1771, he with great accuracy shut up three toads from the air, two of which were taken out alive on the 8th of April 1774. D'Aubenton says†, after a period of 18 months; but in this instance we depend more on the friend ‡ of Fontana, who has mentioned the dates. The two toads were again inclosed, and Herissant died before there was a second inspection. D'Aubenton says, that when taken out their bodies were hard and shrivelled, and their whole moisture totally absorbed. A fourth toad that had been inclosed was heard to croak whenever the box in which it was confined happened to be shaken. Since that period the practice is common of confining snails in a sealed phial, where they exist in torpor for years.

These phenomena still excite wonder, but to wonder less, and examine more, would sooner procure us that information which we are wanting. In these observations concerning toads, have no circumstances been overlooked? Has it been determined whether they lived in the heart of stones, or, existing merely in a torpid state, had come alive when exposed to air? We have seen a toad that was dead for two days; its body was opened; its heart was seen motionless, but exposed to air in a few seconds it began to beat.—Considering the complex function of absorbents, we perhaps might conceive how a toad could live in the clefts of rocks, or the hearts of trees, where there is moisture; but has it yet been determined whether all stones in which toads have been found supplied them with moisture? We at least are certain that they did not

4 R

absorb

Respira-
tion.

55
Eggs and
seeds pre-
served long
when air is
excluded.

56
Herissant's
experi-
ments re-
specting the
toad.
† Encycl.
Method.
Hist. Nat.
tom. 2.
Ovipares.
‡ Dict. de
Merveilles
de la Nat.
Animaux
Vivans
Renfermés.

(D) See Bomare, under the article Œuf; and a fuller account of the same eggs in the *Dictionnaire de Merveilles de la Nature*, under Œuf.

Respira-
tion.

absorb the animal fluids, like the plaster used by the French academicians.

One of the toads was heard to croak after being inclosed. In making their experiments, has it, therefore, been thought a matter of indifference by the French philosophers, whether the animal was immured alive in the full exercise of all its functions, or existing only in its torpid state? and with respect to this singular state, (might not the questions be fairly put), have its several kinds, have the causes which induce it, or those degrees to which it may be carried in different animals, been yet ascertained? Is not our knowledge of the torpid state at this moment principally the result of casual observation? Has it not been oftener than once supposed that the torpor of all animals is similar, or takes place to a similar degree? Have not torpid animals been therefore spoken of in general terms? and has it not been asserted that they retain a portion of heat and internal motion? though some have been found congealed in the ice, and many been dried to such a degree that they could be revived only by moisture.

"That snakes and fishes, after being frozen, have still retained so much of life as when thawed to resume their vital functions, is a fact," says Mr Hunter, "so well attested, that we are bound to believe it." How came it, we would ask, that fishes which had been frozen by this truly ingenious physiologist never recovered? He recovered parts of different animals which had been frozen? Had the snakes and fishes of which he had heard been only partially congealed in the ice? or had the fishes which he selected for these experiments been properly chosen? or may all animals with equal fairness be made the subject of such experiments? and may all transitions from heat to cold, and from cold to heat, whether slow or rapid, if not in the extremes, be viewed as nearly of the same consequence? Are all seasons and conditions of body equally favourable to this state of torpor? and will these causes which induce torpor by operating externally in the months of autumn be able to continue it by the like action in the months of spring? We can answer, no.

58
Reabsorp-
tion of fat
in the tor-
pid state.

It has been said that animals subsist in their torpid state by the reabsorption of fat. Has it therefore been proved that all animals, not to say living bodies, are possessed of fat? or if they be, has it been demonstrated that they have a superfluous quantity to be reabsorbed? Has it been shown that their waste of fat is always occasioned by this reabsorption; or has this reabsorption in all cases been of that kind to counteract the effects of abstinence? If it has not been proved that all animals contain fat, and that this fat is reabsorbed in their torpid state, ought not the general assertion to be limited? Granting that in many respects it were true, have not philosophers been here amusing themselves with logic, where they could have been employed in making experiments? Have they not ventured to give us conclusions, where we had reason to expect facts? and on this account has not their conduct been somewhat similar to that of navigators who, sailing along the coast of Patagonia on one side, and observing

a few men of an uncommon stature, have from thence peopled the whole of the country with a race of giants? or rather to that of some calculators, who, from seeing a few parts of a continent, have ventured to give a map of the whole, to describe kingdoms that are yet unexplored; and by their skill in addition and subtraction to exhibit the figure, the extent, and proportion of lands unknown?

Leaving therefore the torpid state as one of those subjects with which we at present are little acquainted, and of which we therefore cannot speak with certainty in the general abstract language of science; it will naturally be asked, In what respect is air so necessary to all living bodies in their active state, and how it contributes to the regular performance of the different functions?

The ancients, who were led by the heat of the blood to suppose a vital spark in the heart, who had noticed the appearance of smoke in the breath, and who had observed that fire was extinguished when deprived of air, naturally inferred that the end of respiration was to support their imaginary flame, to ventilate the blood in the arteries and lungs, and to keep alive their vivifying spark. They were far, however, from being agreed as to the manner how this was effected. Some were of opinion that a certain principle of the air was absorbed, to which they gave the name of *the provider of life* †, or the food of the spirit ‡; while others were persuaded that the air acted as a refrigeratory, and was merely intended to moderate the fire, to assist in expelling the fuliginous vapour, and preserve the system in an equal temperature.

The moderns, who, after all their researches, have been unable to discover this vital spark of the ancients, are more puzzled to assign an adequate cause for the heat than for any cold which they discover. To account for this singular phenomenon, they have been ransacking nature for causes; and perceiving that putrescence, mixture, and friction, are in many instances accompanied with heat, have thence conjectured that they sometimes operate in producing the warmth of the living body. But these are theories which have been imported from the hot-bed, the laboratory, and mechanic's shop, and which have never yet been countenanced by physiological facts and observations. No one has been able to show that putrescence exists in a healthy state, except in the feces: no one has proved that any mixture which regularly occurs in the elementary canal or vessels, generates heat; and though friction has been a favourite hypothesis, yet those circumstances, in which it evidently produces heat, have not been discovered in the living body; and it is not determined whether it be there a friction of the fluids, a friction of the solids, or a friction of the fluids and solids together.

Of animal heat, the most rational theory, we think, is one which properly belongs to the last century; it is confirmed by modern discoveries, and has ascribed this heat to respiration. Many had observed, that those animals which respire most have the warmest blood (E).

Lower

(E) Quod autem animalia calidiora fortius respirent, non probat respirationem illis potius datam esse, ad sanguinis refrigerium, quam calorem illum intensum produci a validiori respiratione: imo posterius non tantum æque, at magis probabile apparet: quia secundum omnium sententiam calido vivimus, frigido extinguimur.

Respira-
tion.

59

Opinions of
the ancients
respecting
the use of
respiration.† Pabulum
vitæ.
‡ Spiritus
alimentum.

60

Opinion of
Verheyen,

Respira-
tion.

Lower demonstrated, that this blood received a new and a brighter colour in passing through the lungs (f). Verheyen and Borelli both proved, that the air lost something by coming in contact with that organ (g). Mayow showed, that this something which the air loses is contained in nitre (h). Experience taught the workers in nitre, that this something was absorbed from the air (i): and Verheyen remarked, that it is also absorbed by the lungs; and is probably that which maintains combustion; which qualifies the air for giving support to animal life, and imparts to the blood the vermilion colour (k).

61
Supported
by a dis-
covery of Dr
Priestley's.

How well the whole of this reasoning was founded, is proved by the late discoveries of Priestley and other chemists. There is now obtained, in a separate state, an aerial fluid, which maintains both life and combustion, and gives a vermilion colour to the blood. It is extracted in a very large quantity from nitre; is one of the component parts of the atmosphere, and the vital principle of that element; without which, in most animals, life is extinguished. From some phenomena which happen in combustion, it has been termed *principium forbile*. It was called dephlogisticated air by Priestley the first discoverer; as the great acidifying cause in nature, the French nomenclature has given it the name of *oxygenous gas*; and, as one of the causes on which the existence both of fire and of life depends, it is named *empyrean* or *vital air*.

62
Respiration
the cause of
animal
heat, and
how this
heat is pro-
duced.

Late discoveries have shown farther, how this air may in respiration produce heat. From the most accurate investigations, it appears, that caloric, or the principle of heat, is a distinct substance in nature; that it combines with different bodies in different degrees; that it is the cause of fluidity in all; and that, in proportion to that capacity which they have for it, and to that distance at which they are removed from the fluid state, the more or less caloric they con-

tain. Aeriform bodies being all therefore exceedingly fluid, it must be evident, that when they are fixed or condensed in the blood, and made to approach nearer solidity, a quantity of heat must be evolved. A part of this is very plainly evolved in the lungs where the air is absorbed, as appears by the breath; and a part evolved by the action of vessels, as appears from nearly an equal heat over the system, from the partial heat of a morbid part, and the sudden transition from heat to cold, and from cold to heat, over the surface, when the vessels are affected by either internal or external stimuli. When the heat, thus evolved by the gradual fixation of that body with which it was combined, has been successful in making its escape by the lungs and integuments, the blood returns in a dark and a sluggish stream by the veins, and mingles again with the genial fluid, which before gave it spring, activity, and life.

Of that oxygen which remains in the system, part is employed in forming different saline combinations and supplying the waste occasioned by that constant reabsorption; which, from many experiments that have been made with solutions of matter, is known to take place in the solid bones. The use of that oxygenous gas which returns with the breath, is best understood after knowing its affinities. Its basis oxygen, combining with hydrogen, which is the basis of inflammable air, forms water; and combining with carbone, the carbonic acid. It carries, therefore, back with the breath a part of the carbone produced by the slight combustion of the blood, and a quantity of hydrogen arising from the watery fluid decomposed.

But oxygenous gas does not alone enter the lungs. Of 100 parts of the atmosphere, but 28 are oxygenous gas, $\frac{1}{100}$ is carbonic acid, and 72 are azotic gas (l). These last, though intended chiefly for other beings different from man, which are in immense numbers on the globe, but which, like him and the nobler animals are not formed

Respira-
tion.

63

Gases which
compose the
atmosphere
which we
breathe,
and their
use in respi-
ration.

4 R 2

Ut proinde non videatur aliquid a natura datum esse, quo intenditur frigus vitæ contrarium. Verheyen, Tract. 2. cap. 7. de Ufu Respirationis.

(f) Postquam circulatio sanguinis innotuit, diu creditum fuit sanguinem venosum colore illo coccineo rursus indui in ventriculis cordis, et præcipue ubi calor, quem judicabant istius coloris authorem, est intensior: At negotium istud peragi in pulmonibus, nempe respirationis beneficio, evidenter ostendit cl. Lowerus experimentis. *Ibid.*

(g) Inquiramus quale sit istud aereum adeo nobis et multis animalibus necessarium. Ut ejus defectu vita extinguatur citissime. Vulgaris enim aer dici non potest, cum illum per meatus notabiliores sanguini immitti conveniret, sitque experientia certissimum, animalia respirantia non tantum aëre simpliciter; sed etiam recenti continuo indigere, unde concludendum est tantummodo aliquas particulas subtiliores ab aëre secerni, et massæ sanguinis immisceri, quibus spoliatus ad ulteriorem respirationem sit idoneus.

(h) Et quidem verisimile est, inquit Mayow, particulas quasdam indolis nitrosalinæ, easque valde subtiles, agiles, summeque fermentativas ab aëre pulmonum ministerio secerni, inque cruoris massam transmitti. Adeo enim ad vitam quæcunque sal istuc aereum necessarium est, ut ne plantæ quidem, in terra, ad quam aëris accessus precluditur vegetari possint; sin autem terra ista aëri exposita, sale hoc fecundante denuo impregnetur, ea demum plantis alendis iterum idonea evadet.

(i) In aëre autem quid nitrosum contineri norunt ipsi vulgaris nitri confectores, qui terram aut laterum fragmenta ex quibus nitrum elixivare intendunt, aëri liberiori diu multumque exponunt; utque ab eodem undique ea tangente ac perfluente uberius impregnetur, sæpius vertunt, atque ita suorum sumptuum et laborum ampliorem messem mercedemque referunt.

(k) Insuper, si post confectionem nitri terra aut laterum fragmenta exponantur libero aëri, ea denuo post aliquod temporis spatium, quodam sale nitroso abundabunt. Est autem verisimile, aerem gratia ejusdem materię et vitæ nostræ continuationi et ignis accensione necessarium esse; præcipue cum rursus experientia doceat ruborem sanguinis e corporeeducti, per additionem salis nitri intensum iri in eodem prorsus modo secuti, per respirationem in corpore vivente. *Ibid.*

(l) These are nearly the proportions.

Respira-
tion.

ed to breathe the empyreal air, must notwithstanding be of some important and essential use to all living bodies. It has accordingly been found by experiment, that pure and unmixed oxygenous gas cannot be breathed for any very considerable time without danger; that some azote is contained in the blood, and has been extracted from the muscular fibre, when properly treated with the nitric acid. According to Berthollet, five of its parts with one of hydrogen forms ammonia or volatile alkali; which dispels the glandular tumours of the body, and prevents the coagulation of blood and the thickening of mucus which arise from acids (M). The azotic gas may therefore in part unite with hydrogen, may prevent the coagulation of serum, the catarrhus formation of viscid mucus, and many combinations that oxygen might form, injurious to the system. The carbonic acid, which is $\frac{2.8}{100}$ of carbone and $\frac{7.2}{100}$ of oxygen, may also be necessary in regulating the effects of the other two. In aerated water, its uses are very generally known: it allays the pain of the urinary bladder when excited by calculus; it has been employed in the cure of wounds, and been thought useful in the pulmonary phthisis. It is generated in the lungs of those animals which respire oxygen. In small proportions it favours the growth of the vegetable tribes. These tribes readily decompose it; and, with the addition of other prepared oxygen from water, restore what is pure to the general mass of the vital fluid, that plants and animals might thus live by the mutual performance of kind offices.

64
How an
animal pre-
serves its
natural
warmth in
a cold tem-
perature.

We return again to animal heat. Every theory that pretends to account for animal heat, ought also to account for that singular equality of heat which the system preserves, or endeavours to preserve, in different temperatures. The above theory explains it simply in the following manner.

Venous blood, if exposed to the air, is known to absorb a portion of oxygen, and assume that colour which it has in the pulmonary veins and aorta. Suppose an absorption of a similar kind taking place in the lungs, a fact which may be proved by decisive experiments; it is plain that the oxygen by this absorption must recede from its gaseous or fluid state; that a quantity of heat must be therefore evolved, which, along with the heat of the reflux blood, is carried away by that vapour which issues from the lungs. In the course of circulation, the oxygen will naturally incline with hydrogen to form water; it will tend likewise to the formation of many other compounds; and, as it enters into new states, and is farther removed from gaseous fluidity, it must still be giving out a portion of heat. If the surrounding temperature be cold, this separation will be easily effected. The caloric will, in that case, be greedily absorbed from the interior surface of the lungs and exterior surface of the whole body. The oxygen, meeting with the necessary temperature, will readily pass into new forms; and the venous blood returning to the lungs, will demand a supply which

will be either greater or less according as the cold, by favouring the escape of the caloric, and promoting new combinations with oxygen, had removed it from the point of usual saturation.

Respira-
tion.

The gradual evolution of heat is a proof that the temperature must be sometimes reduced before the oxygen can properly enter into all the usual combinations of the system. Suppose the body then to be placed within a hot circumambient atmosphere. This atmosphere, if warmer than the animal, will be more apt to part with heat than to receive it; and the oxygen absorbed, being thus unable to dispose of its caloric, will be prevented from passing into those combinations and forms where heat is evolved. The venous blood will therefore conduct it back to the lungs, and make a demand for a new supply; but proportionally less according as the hot circumambient air, by preventing the escape of the caloric, and the usual facility of new combinations, has confined its removal to a smaller distance from the point of saturation.

65
And its na-
tural cool-
ness in a
warm tem-
perature.

In this last case the thing principally entitled to notice is a very curious effort of nature to resist the growing increase of heat. In the warm atmosphere, as during violent muscular exertion, the exhaling vapours are commonly discharged in a greater quantity from the surface of the body; and consequently the heat furnished with an excellent temporary conductor, that in some measure counteracts the dangerous effects from without.

After all, the reader is not to suppose that he here has received a general theory of respiration. All living bodies are not supported by the same kind of aerial food. Oxygenous gas has indeed been honoured with the flattering appellation of vital air; and nitrogenous gas has been usually distinguished by that degrading epithet azotic; a word which signifies destructive of life. But though man, and all the warm-blooded animals that have yet been examined, may die in respiring the nitrogenous gas, this gas however, which constitutes more than two thirds of the whole atmosphere, may in general be called the vital air of the vegetable tribes, and of not a few of the orders of insects which thrive and live in it. For while man, and others which respire as he does, emit both the hydrogen and carbone, and return the nitrogen not sensibly diminished; most vegetables and many insects eagerly inhale them, and emit oxygen as noxious or useless. These effects are the indications of a radical difference in constitution. Even the fibres of those living bodies which exhale oxygen, will, after death, attract it so powerfully, as to decompose the nitric acid; but those bodies which inhale nitrogen, have so very weak an affinity to oxygen, and so strong a one to some of the bodies with which it is combined, that they can easily decompose water and carbonated air.

What fishes respire is not ascertained. Neither the change of the air, nor of the water which they occasion when in close vessels, have, so far as we know, been fully examined. Chaptal is assured, that, like other animals, they are sensible of the action of all gases. Fourcroy

67
Respiration
of fishes,
and their
tempera-
ture.

(M) Weak volatile alkali dissolves mucus, whose morbid viscosity Fourcroy has ascribed to a too great absorption of oxygen.

Respiration.

eroy says, that they do not generate the carbonic acid; and that the air which Priestley and he found in the air vesicles of carp was nitrogene gas. Their thermometrical heat is so low, that in D'Aubenton's table they are reckoned among the cold-blooded animals.

68
Temperature of plants.

The temperature of plants is still lower. The heat of a tree which the very ingenious Hunter examined, though several degrees above that of the atmosphere when below the 56th division of Fahrenheit, was always several degrees below it when the weather was warm. When taken out, the sap was observed to freeze at 32°; while in the tree, it would not freeze below 47°. The very profuse perspiration of vegetables greatly moderates the heat in their surface; and as air which absorbs moisture expands, and becomes thereby specifically lighter, there is a regular current produced, and evaporation rapidly promoted by the dense air displacing the rarefied.

69
How the natural heat of living bodies is to be estimated.

To adopt here a general language with respect to the heat which is developed in all living bodies, it is proportioned to the quantity of matter which is by means of the vital powers reduced to a state more nearly approaching solidity; to the kinds of the substances which are reduced, and to the degrees and kinds of the reduction.

In all living bodies there appear to be certain degrees of heat, peculiarly fitted for carrying on their

various economical operations. What these are, in the different kinds of plants and animals, is not known. The bear, the hedge-hog, the dormouse, and the bat, may probably not digest when reduced to 70°, 75°, or 80°. The frog, however, will digest at 60° (N); and the birch before it arrives at 47° (O). It would seem that respiration, besides imparting aerial food, was intended to preserve and regulate these different degrees of heat. It raises the heat after a meal; it suffers it to fall in the time of sleep; it withdraws the supply when the atmosphere is warm, and increases it again when the atmosphere is cold. It should therefore be remembered, that heat merely is not the object which is solely aimed at in respiration. All living bodies have their congenial degrees of heat. The regulation of these is important: on the one side, it prevents the dissipation, on the other the coagulation, of their fluids; it preserves the living power of their organs; and, by a natural and proper temperature, assists their action in mixing, composing, in decomposing, and in variously preparing the different parts for secretion, excretion, absorption, reabsorption, and assimilation (P).

As various fixations of the vascular fluid are regularly taking place in the different parts of the living body, and as air is not the only fluid concerned, it should almost be unnecessary again to observe, that the whole of the heat is not evolved in the lungs, nor the whole that is evolved disengaged from air.

It

(N) See observations on certain parts of the animal economy by Mr Hunter. We allude here to his experiments and observations on animals, with respect to the power of producing heat.

(O) See Dr Walker's excellent Paper on the motion of the sap in trees, 1st volume *Philosophical Transactions*, Edinburgh.

(P) The ingenious Dr Crawford has published a theory of animal heat different from that which we have here presented to our readers. Assuming as a fact, that heat and phlogiston are two opposite principles in nature, he goes on as follows.

"Animal heat seems to depend upon a process similar to a chemical elective attraction. The air is received into the lungs containing a great quantity of absolute heat; the blood is returned from the extremities highly impregnated with phlogiston; the attraction of the air to that of the phlogiston is greater than that of the blood. This principle will therefore leave the blood to combine with the air: by the addition of the phlogiston, the air is obliged to deposit a part of its absolute heat; and, as the capacity of the blood is at the same moment increased by the separation of the phlogiston, it will instantly unite with that portion of heat which had been detached from the air.

"We learn from Dr Priestley's experiments with respect to respiration, that arterial blood has a strong attraction to phlogiston (become a vague word with different meanings in different authors). It will consequently, during the circulation, imbibe this principle from those parts which retain it with the least force, or from the putrescent parts of the system: and hence the venous blood, when it returns to the lungs, is found to be highly impregnated with phlogiston. By this impregnation its capacity for containing heat is diminished. In proportion, therefore, as the blood which had been dephlogisticated by the process of respiration becomes again combined with phlogiston in the course of circulation, it will gradually give out that heat which it had received in the lungs, and diffuse it over the whole system.

"To account for the stability of animal heat, he observes, that as animals are continually absorbing heat from the air, if there were not a quantity of heat carried off equal to that which is absorbed, there would be an accumulation of it in the animal body. The evaporation from the surface, and the cooling power of the air, are the great causes which prevent this accumulation: and these are alternately increased and diminished in such a manner as to produce an equal effect. When the cooling power of the air is diminished by the summer heats, the evaporation from the surface is increased: and when, on the contrary, the cooling power of the air is increased by the winter colds, the evaporation from the surface is proportionally diminished." See *Crawford on Animal Heat*, p. 73—84.

Besides, supposing that the principles of fire and inflammability are opposites in nature; this theory supposes that the blood, while in the lungs, gives out phlogiston and takes in heat; but that, during the remaining course of circulation, it gives out heat and takes in phlogiston: it supposes, that this phlogiston is collected from parts that retain it with little force, or from the putrescent parts of the system; it is not said where: it

supposes.

Respira-
tion.72
All the air
in a living
body does
not enter
by the
lungs, nor
is contained
in them.*See Obser-
vations on
Digestion,
by the late
Mr Hunter.† Borelli de
Motu Ani-
malium,
cap. 23.
De Natatu,
prop. 209.
‡ Chaptal's
Elements of
Chemistry,
vol. i. § 5.
chap. 2.§ Anatomical
Descript. of
the Demoi-
selle of Nu-
midia, by
the French
Academy.73
Respiratory
organs.

It may farther be remarked, that the whole of the air does not enter by the lungs; much is contained in the liquid and solid parts of the food. It is extricated often in the process of digestion; and when the organs are vigorous and healthy, is made subservient to the general economy. If the organs, however, should happen to be languid, it scorns their authority, which cannot be enforced; from being friendly, it soon becomes inimical to the system, and threatening danger accumulates, not only in the stomach and intestines, but in other cavities. It has been found in the cellular membrane; in certain vesicles formed for itself; in the uterus; in an abscess; and in gun-shot wounds: It has sometimes burst from the vagina with a sort of noise*. And in a nephritic complaint of a horse, we have observed it flowing in a stream from what the farriers denominate the *sweath*.

In some kinds of aquatic plants, in eggs, and in a variety of fishes, there are certain vesicles containing air, which seem to have certain necessary functions allotted them by nature. In the plants and in fishes they were once supposed to have been wholly intended for swimming (Q). It was remarked, that those fishes which remain constantly at the bottom of the water have no air vesicle; and that a fish whose vesicle was burst by means of the torricellian vacuum, though it lived for a whole month after in a pond, was never able to rise to the surface†. The practice, however, which some fishes have of ascending at times to inhale air, and descending after their vesicle is filled‡; the communication which, in some fishes, this air vesicle has with the stomach; that power in the pigeon and some other birds of introducing air into the crop§; and lastly, the air which is uniformly found in impregnated eggs—would tempt us to believe that these natural collections of air, with their other uses, may perform some essential service in nutrition.

Having explained the general intention of respiration, we are now to inquire, what are the kinds of respiratory organs, and in what manner their functions are performed? The preceding table has in some measure made us acquainted with this subject. Some animals breathe by a trachea and lungs; insects, by either stigmata or tracheæ, opening into air vessels; plants,

by air vessels and leaves; fishes, and numbers of the watery element, if they do not breathe, at least receive air by their gills; the foetus in ovo, the polypus tribe, and many more organized bodies, by the same organs which convey their food.

The absorbents appear to be the first and most general way by which living bodies are supplied with air: the mouths of these vessels are like small tubercles, scattered over the body of the insect while wrapt in its membrane. In the horse and the bird they are blood-vessels spreading on a membrane, and deriving nourishment from the uterus or egg, that had been itself nourished by absorbents: In a cow, they are vessels which, spreading on a membrane, terminate in glands; these glands being opposite to others which adhere to the uterus; and the membranous and uterine glands, when in contact, inclosing a third gland like a kernel. In man, they are vessels spreading on a membrane, and entering a large glandular body called the *placenta*. In the mouse and the hare, they are likewise vessels branching on a membrane, and entering a placenta: this placenta, when it happens to be fixed, receives large veins from the parent, and which may be either inflated or injected from the cavity of the uterus.

Those which are properly respiratory organs, exercise not their function till circulation and nutrition are begun: though, if the observation of Garman be just, that the air may become a real food for the class of spiders, or if it be true that the larvæ of ants as well as of several insects of prey, increase in bulk, and undergo their metamorphoses without any other nourishment than air§, this law is not universal. It may, however, be doubted, whether some moisture be not absorbed. With regard to the ant, we have reason to suspect that the observations on which such a conclusion was founded have not been accurate.

Not only are the respiratory organs thus late in exercising their functions; in many vegetables a great part of them is annually renewed and laid aside in the torpid state. In those insects which undergo the most remarkable kinds of transformation they suffer a change; and in all those animals which spend their earlier days in the water, and afterwards come to live in the air, they are altered in kind.

In

supposes that the blood, in passing through the lungs, receives heat only: that the whole of this heat is evolved in the lungs by precipitation; and is thence diffused over the system as from a centre or focus: in which case, we must also suppose that the lungs are the warmest part of the body; and that the heat of the other parts will be in proportion to their distance from the lungs, or the length of the vessels through which it has passed.

As for the stability of animal heat, this theory ascribes it entirely to foreign causes; to the different degrees of evaporation; or to the varying states of the air.

The singular meaning which this theory gives to the word *phlogiston*, must strike every one who knows the etymology of that word. The celebrated Stahl found it in the Greek; and applied it naturally to signify pure elementary fire, or the most pure and simple inflammable principle in a state of combination. Mr Kirwan has since used it to express hydrogen: Dr Priestley has called the azotic phlogisticated air: and Dr Crawford, who seems to take phlogiston in the sense of Mr Kirwan, speaks likewise as if he understood it in the sense of Dr Priestley. Mr Kirwan's phlogisticated air, however, will not kindle without oxygen: Dr Priestley's will extinguish fire: and Dr Crawford's is directly opposed to that principle. These are not the ancient doctrines of Stahl: they are new ideas expressed in one of his antiquated words; the meaning of that great man is neglected. The sounds which he uttered, like the dead language of an old ritual, are among a few still in veneration.

(Q) Borelli has shewn how, by contracting the air vesicle or allowing it to expand, the fish can rise, sink, or remain stationary in the water. Borelli de Natatu.

Respira-
tion.74
Absorbents.75
Respiratory
organs late
in exerci-
sing their
functions.§ Chaptal's
Elements of
Chemistry,
vol. iii. § 1.
art. 5.76
Sometimes
renewed,
sometimes
changed for
a different
kind.

Respira-
tion.

Respira-
tion.

In all living bodies the proper function of one part of the respiratory organs is, to secrete from the water or air that particular aeriform fluid which mingles with their juices, and which is necessary to life and nutrition. In many cases these organs are placed externally, and are always in contact with the air or water from which they secrete. In other cases they are lodged internally; and air or water are then alternately admitted and expelled by varieties of organs which serve as auxiliaries.

77
Respira-
tory organs
of plants;

The plants secrete their aeriform fluid from water and air. They receive air along with the liquids of their absorbents, which open on the roots, the trunk, and the branches, and upon the inferior surfaces of leaves; or, if nature has plunged these leaves under water, the absorbents open and imbibe their fluids on both sides. In many, however, the upper surface of the leaf is intended to inhale air. Bonnet observed, that when this surface was applied to the water the leaf died soon; but that when the lower surface was applied, it lived for months. It has also been remarked, that the upper surfaces of some leaves will repel water; and that the death of the leaf will ensue when its breathing pores are obstructed with oil*. We hence learn why aquatic plants rise up to the surface of the water and spread their leaves in the open air: and as it is proved by Ingenhouze and others, that the respiration of many leaves is assisted by light, we see a reason why plants growing in a dark room turn to the place where light is admitted; why the flowers and the leaves of many plants follow the diurnal course of the sun; why the branches of trees, which require much light, die when placed in a thick shade; why moonshine in autumn contributes so much to the ripening of grain; and why leaves and branches are arranged in such a manner as least to intercept that quantity of light which nature has allotted to the genius of each.

* Botanic
Garden,
note 37.

† Grew's
Anat. of
Plants, B. 3.
ch. 3. § 10.
‡ Ibid. B. 3.
ch. 2.

78
Of insects;

The air vessels in the body of plants are those vessels which contain juices but at certain times, and which during the greatest part of the season are filled with air†. This air is collected from the sap of the roots as it passes along the diametral insertions, and from those vessels which open upon the trunk and upon the leaves‡. Like pulmonary tubes, which are seen branching through the bodies of insects, they perform an office similar to that of the tracheæ and bronchia; and are those general receptacles of air from which the neigh-

bouring parts of the plant secrete what is needed: for in plants and a certain number of insects, the functions of the lungs, the stomach, and the heart, are generally diffused. The several parts can respire, digest, and circulate fluids on their own account; and if they should chance to be severed from the whole, can live and grow, and propagate their kind.

The air vessels are surrounded by those which contain a liquid during the whole time of the growth. They are the largest vessels of the wood, as distinguished from the bark; and in the leaves they may sometimes be seen even without the assistance of glasses. Their cavity is formed by certain fibres which wind spirally like a cork-screw. In the leaf they generally approach and recede like the filaments of nerves; but they never inosculate from one end of the plant to the other, except at the extremities§; they resemble the pulmonary tubes of insects by their general dispersion over the system, and the spiral rings of which they are composed(¶); they differ in this, that the pulmonary tubes are frequently observed to anastomose in their larger branches, as the ramifications of a vein or artery do in their smaller capillary twigs.

§ Grew's
Anat. of
Plants, B. 3.
ch. 3. § 27—
29.; and
B. 4. part I.
ch. 4. § 17—
19.

The respiratory organs, which are similar either to the gills of fishes or the lungs of man, can hardly here claim a description, as their nature and forms are so generally known. There is one circumstance, however, in birds which arrests our attention: the cells of their bones, and the numerous vesicles of their soft parts which communicate with the lungs, have been deservedly a matter of surprise to most physiologists. In accounting for their use, the ingenious Hunter supposed that they lessened the specific gravity and assisted flying; that being the circumstance which he thought most peculiar to birds. Learning afterwards that they were in the ostrich and not in the bat, he supposed that they were appendages to the lungs. In amphibious animals, in the snake, viper, and many others, he observed, that "the lungs are continued down through the whole belly in form of two bags, of which the upper part only can perform the office of respiration with any degree of effect, the lower having comparatively but few air vessels(s)." In these animals, the use of such a conformation of the lungs was to him evident. "It is in consequence of this structure," said he, "that they require to breathe less frequently than others." From this reasoning he naturally

79
And opi-
nions con-
cerning the
pulmonary
appendages
in birds,
&c.

(r) See the spiral rings in the pulmonary tubes of a bee, Plate XVII. fig. 10. Swammerdam's Book of Nature, or History of Insects.

(s) The same observations were long ago made by the immortal Harvey. After observing that both the transverse and longitudinal membranous diaphragms of birds contributed to respiration, he adds, "Et alia, ut nunc taceam. Avis præ cæteris animalibus non modo facillime respirat, sed vocem etiam in cantu diversimode modulatur: cum tamen ejus pulmones lateribus et costis adeo affixi sunt, ut parum admodum dilatari, assurgere, et contrahi possint.

Quinetiam (quod tamen a nemine hæcenus observatum memini) earum bronchia sive asperæ arteriæ fines in abdomen perforantur. Aëremque inspiratum intra cavitates illarum membranarum recondunt. Quemadmodum pisces et serpentes intra amplas vesicas in abdomine positas, eundem attrahunt et reservant, eoque facilius natare existimantur. Et ut ranæ ac bufones cum æstate vehementius respirant, aëris plus solito in vesiculas numerosissimas absorbent (unde earum tam ingens tumor) quo eundem postea in coactione liberaliter expirant. Ita in pennatis pulmones potius transitus et via ad respirationem videntur quam hujus adequatum organum. De Generat. Animal. Exercit. 3.

Respira-
tion.

turally inferred, that the motion of flying might render the frequency of respiration inconvenient; and that a reservoir for air might therefore become singularly useful. The bat and the ostrich, however, are here as formidable objections as before. The bird respire frequently when at rest, and when it flies to our bosom from the hawk; that frequency seems to have been increased by what is a general and a common cause, an increased degree of muscular exertion. Had air cells been intended merely to prevent the effects of a rapid motion on respiration, we might expect to see them in greyhounds and a number of quadrupeds, much more readily than in some birds whose flights are neither rapid nor long.

This great physiologist was not aware that the circumstance most peculiar to birds was not their act of flying, but their feathers, which contain a large quantity of air, and which require a regular supply, whether they soar on the wings of the eagle, or remain on the ground, attending the ostrich (τ).

Both in amphibious animals and birds, the air of the vesicles has passed the respiratory surface of the lungs. In the tracheæ of plants and the pulmonary tubes and vesicles of insects, it is only proceeding on its way to be respired. Would it be worth while to inquire whether vegetable substances, and those which are called corneous in animals, require a different preparation of air from what is the common preparation of lungs? whether hair grows best, or the cuticle thickest over soft parts that are cellular and spongy (υ)? and whether the animals that bear horns have larger sinuses in the frontal bone of their cranium than others? From the general diffusion of air through the birds, and the situation of their vesicles beyond the lungs, it would appear that the pulmonary viscous in these animals does not respire or secrete air for the whole system; and we

are certain, that in plants and insects most parts respire the air for themselves, and that there is no particular part appointed to secrete air for the whole.

We here speak of respiratory organs as those which secrete an aeriform fluid from water and air; but our language probably had been more accurate had we called them the organs in which an aeriform fluid is absorbed by their liquid contents, as these flow by, either wholly or in part, in their course through the system. It was long denied that any absorption of the air took place from the pulmonary surface; and speculative reasoners had attempted to prove that no air could pass to the blood through the membranes of the lungs, because air had refused upon some occasions to pass through pieces of wet leather that had been exposed to it for that purpose. Borelli, however, endeavoured to show how air in the lungs might mingle with the blood, and how some always disappeared in respiration. There are few doubts now entertained on this subject. Venous blood inclosed in a bladder by the celebrated Priestley discovered such an attraction for oxygen, that it absorbed the aeriform fluid through all the coats of the resisting medium, exhibiting an instance and beautiful illustration of the chemical affinities which take place in this function.

The reader will observe, that the two words *respiratory organs* are here employed in what may be rather a particular sense. The truth is, there are two kinds of respiratory organs, which, though sometimes included in the general expression, should always be considered as perfectly distinct. The first kind comprehends those in which the water and air is decomposed; the second, those by which these fluids are properly applied to the respiring surfaces of the former. We observe these last in the fluttering motion of the leaf itself, or in that tendril which turns the surface of the

(τ) "The use of this retention (of the air in the vesicles of birds) is not well known to us, at least in respect of the upper pouches; so in regard of the lower ones. The use of this retention has been explained in the description of the OSTRICH: where it was shown that there is a probability that the air contained in the lower pouches serves to compress the viscera, and make them rise upwards. Some do think that this retention of air serves birds to render them lighter in flying, like as the bladder which is in fish helps them to swim. And this conjecture would have some foundation, if the air contained in the bladders of birds were as light in proportion to the air in which they fly, as the air contained in the bladders of fish is in proportion to the water in which they do swim. But to say something which hath at least a little more probability, waiting till we have a more certain knowledge of the truth and use of this retention of air, we consider that the birds generally rising very high, and even to the place where the air is a great deal lighter than it is near the earth, might be deprived of the principal advantages of respiration for want of an air whose weight might make on the heart and arteries the compression necessary to the distribution and circulation of the blood: If they had not the faculty of containing a long time a portion of air, which being rarefied by the heat which this retention produceth therein, might, by enlarging itself, supply the defect of the weight of which the air that they do breathe in the middle region is destitute. For if there be a great many birds which do never rise very high into the air, whose lungs have notwithstanding these bladders in which the air is retained; there are also a great many that have wings which they use not for flying. And it may be observed, that there are found some parts in animals which have not any use in certain species, and which are given to the whole genus, by reason that they have an important use in some of the species. It is thus that in several kinds of animals the males have teats like the females; that moles have eyes; ostriches and cassowars wings; and that land tortoises have a particular formation of the vessels of the heart which agrees only with water tortoises, as it is explained in the description of the TORTOISE." *The Anatomical Description of a Cassowar*, by the Royal Academy of Sciences at Paris. We can hardly answer for the justness of this reasoning, which maintains that the genus has useless parts merely in complaisance to the species.

(υ) Nails and hair grow after death, and a quantity of air is evolved in putrefaction.

Respiration.

Respiration.

82
Auxiliary organs of respiration.

the leaf to the sun. We see them producing these oscillatory motions in the branching gills of the *pulex arborefcens*. When the breathing surface is within the body, we discover them again in the tracheæ of plants, whose cavity is formed by a spiral fibre that is seemingly intended for some kind of peristaltic motion. We detect them likewise in the pulmonary tubes, in the spiral rings, and in the abdominal movements of insects. We see them in fishes swallowing the water and propelling it onward through the fringes of the gills. In the frog, we note them by the motions of the pouch between the sternum and the lower jaw. After this animal is divided transversely behind the fore legs, this pouch continues to fill and to empty itself downwards by the trachea where the lungs were. When the whole integuments and some of the muscles between the jaw-bone and sternum are removed, we see how the pouch was dilated and contracted by a broad cartilage connected with the trachea, and attached by muscles to the inside of the sternum and the neighbouring parts. When the pouch is enlarged, the air rushes in through the two nostrils at that time expanded; and when it is contracting, the glottis starts up with an open mouth to the middle of the pouch, and the air is pressed down through the trachea to the lungs. This amusing sight will sometimes continue for a whole hour. In man and all the warm-blooded quadrupeds, the thorax or cavity where the lungs are placed is dilated and contracted by the diaphragm and muscles attached to the ribs. In the time of dilatation the glottis opens, as we see in birds: the air rushes in, supports the incumbent weight of the atmosphere, and enables the thorax to expand wider. The expanding powers having made at last their usual effort, their antagonists succeed, exert their force, and the air is expelled.

83
Assisted by the pressure of the atmosphere.

In applying either the water or air to the breathing surface, all these auxiliary organs are assisted by the circumambient fluid which presses equally on all sides. When a Florentine flask is applied to the mouth, and all communication between the larynx and external air entirely cut off, it requires an effort to bring the air of the flask into the lungs. The weight of the atmosphere is therefore assisting in respiration; and the air, whether in the lungs or the thorax (x), must not be so dense as that which is without. When Verheyen perforated the thorax of a dog, and restored the equilibrium betwixt the external and internal air, the respiration of the lungs ceased, though for some time the alternate admission and expulsion of air was continued through canulas introduced into the wounds.

84
How this pressure raises the thorax.

It cannot surely be asked here, how the pressure of the atmosphere should be assisting in raising the thorax, and thus seemingly counteract itself? The heat of the lungs expands the air as soon as it enters. The air rapidly absorbs moisture; and though not usually noticed by philosophers, yet the sudden expansion, which is always the consequence of that absorption, is a very general phenomenon in nature. By this heat, or by this absorption, the air would occasion greater dilatation, were it not for the lungs, which seek to collapse;

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the cartilages of the sternum, which seek to recoil; and the stretched-out muscles, which either spontaneously, or directed by the will, endeavour to contract and produce expiration.

Having seen how the air will rush in on the opening of the glottis, we may also conceive how the shutting of the glottis will resist the force of internal expansion, and support a weight laid upon the breast. The confined air will expand equally on all sides, and the pressure must be great before the space which falls to the glottis can exceed its own muscular force and the weight of the atmosphere. It is this diffused pressure of fluids that produces such striking wonders in hydraulics; and which explains how the droppings of the ureters should expand the bladder even to a palsy, and overcome the abdominal muscles.

85
How the expansion is continued.

To account for the action of these organs which serve as auxiliaries in respiration, there have been supposed an appetite for air which prompts as a stimulus; an influence of the will, though we breathe while asleep; and a natural instinct, which indeed may exist, but explains nothing. In specifying the several organs concerned, we have heard of an expansile power of the lungs, of a certain pressure of the phrenic nerve, of a muscular diaphragm, and of the action of oblique intercostals. But these explanations are from a limited view of the subject. The expressions used may indeed be general; but their meaning is particular, narrow, and confined; and their allusion is only to man, or perhaps to a few of the warm-blooded quadrupeds: for where are the intercostals of the frog? where is the muscular diaphragm of birds? where the pressure of their phrenic nerve? and where the expansile power of their lungs?

86

Opinions concerning the organs of respiration.

It is fortunate for man that these assisting respiratory organs are in some measure subject to his will. By this subjection he produces vocal sound when he pleases, divides it into parts, varies it by tones, forms it into words, and enjoys the distinguished and numerous advantages that may be derived from a spoken language.

87
What organs form articulate sounds.

SECT. II. Digestion.

As respiration succeeded the placenta in one of its offices by maintaining life, the function of digestion succeeds it in another by either continuing or supporting the growth of the living body. It depends on respiration for a portion of heat, and is that function by which the liquid and solid food undergoes its first preparation in the system.

88

Digestion.

Though gaseous fluids, including the principles of heat and light, may be proved to nourish and compose the substances of all living bodies, yet a part only can enter the system in a gaseous state. This part is changed by the lungs, or by those fluids which they contain. The organs of digestion, before they can act on aerial bodies, must have them reduced to some new form. For the food of vegetables, this form requires to be water, whose 100 parts are found to consist of $84\frac{1}{2}$ of oxygene and $15\frac{1}{2}$ of hydrogen. See WATER.

89

Gaseous fluids compose the substance of all living bodies, and two of the gasees form WATER.

4 S

When

(x) Supposing that there be any in the thorax.

Digestion.

When the gases have passed through both the watery and vegetable states, they, as juices or solids, become the food of a great many animals. These animals produce new changes, and by their preparation the gases become the food of others which are called carnivorous; and then the carnivorous and all living bodies, when the vivifying principle has ceased within them, and when they are hastening to a state of dissolution, are devoured by others who feed on corruption, are partly converted into water and gas, and become in their turn the food of the kinds on which they had fed.

As these effects of the digesting and assimilating powers are more surprising than any chemical process of art, it may not be unpleasing to take a more particular view of them. It has long been observed, that those animals which are not carnivorous feed upon plants; and, since the days of Van Helmoest and Boyle, it has been suspected that plants live upon water and air. This suspicion has now been confirmed by

90
Vegetables
live on pure
water.

numerous experiments. Plants have been raised from distilled water without earth, and, instead of requiring a vegetable mould, have spread their roots in moss, in paper, in cotton, in pieces of cloth, in pounded glass, and powder of quartz. From these facts, the ingenious Chaptal has been led to suppose that soils act but as so many sponges, affording water in different proportions, and in different ways; and that all that the plant wants from the soil is a firm support, a permission to extend its roots where it chooses, and that proportioned supply of humidity which will secure it against the alternatives of being inundated or dried up. To answer, however, these several conditions, he allows it to be necessary in many cases "to make a proper mixture of the primitive earths, as no one in particular possesses them. Siliceous and calcareous earths (he says) may be considered as hot and drying, the argillaceous as moist and cold, and the magnesian as possessing intermediate properties. Each, in particular, has its faults, which render it unfit for culture. Clay absorbs water, but

91
Use of soil
to vegeta-
bles.

does not communicate it; calcareous earth receives Digestion. and gives it too quickly; but the properties of these earths are so happily opposed that they correct each other by mixture. Accordingly we find, that by adding lime to an argillaceous earth, this last is divided, and the drying property of the lime mitigated, at the same time that the stiffness of the clay is diminished. On these accounts it is that a single earth cannot constitute manure, and that the character of the earth intended to be meliorated ought to be studied before the choice of any addition is decided on. The best proportions of a fertile earth for corn are three eighths of clay, two eighths of sand, and three eighths of the fragments of hard stone.

The advantages of labour consist in dividing the Use of a- earth, aerating it, destroying useless or noxious plants, griculture to vegeta- and converting them into manure by facilitating their bles.

So far is vegetable mould from communicating any thing new to plants, that it rather owes its formation to them*, and if sea salt should at times be requisite to * Chaptal's marine vegetation, it is to be remembered that salts, Elem. of sulphur, and lime, are all products of organized bodies; Chem. vol. iii. that iron (y) itself has been discovered in plants and part 4. animals; and that even diamonds, quartz, crystals, § 2. the spars, gypsum, &c. are found only in those earths that beginning, and § 5. are partly composed of an impoverished vegetable residue, art. 3. which provident nature seems to have reserved for the 93 reproduction or reparation of the earthy and metallic Earths and substances of the globe; while the vegetable mould on metals ve- these organic parts that remain are made to serve as getable produc- nourishment for the growth of succeeding plants (z). tions.

If those earths in which plants are reared, and which contain no vegetable mould, should ever be sensibly diminished in weight, a circumstance, we believe, which seldom takes place if proper precaution be used to prevent it; yet if it should happen, it should not in that case be forgotten that gases are the general cements in nature; that they mix intimately with the hardest bodies; and that this sensible diminution of weight

(y) Whether iron exists formally in organized bodies, or is the result of decomposition, it derives its origin ultimately from gases. Blood gradually decomposed by putrefaction yielded not only more salts and lime, but much more iron than blood, suddenly decomposed by lime. Though the greater part of an animal or vegetable, therefore, be without such substances as salt, lime, iron; yet when decomposed its parts may recombine, and thus produce them. See *Surgical and Physical Essays*, by Mr John Abernethy.

(z) "Vegetables in their analysis present us with certain metals, such as iron, gold, and manganese. The iron forms near one-twelfth of the weight of the ashes of hard wood, such as oak. It may be extracted by the magnet. We read in the *Journaux de Physique* an observation, in which it is affirmed that it was found in metallic grains in fruits. Vegetables watered with distilled water afford it as well as others.

"Becher and Kunckel ascertained the presence of gold in plants. M. Sage was invited to repeat the processes by way of ascertaining the fact. He found gold in the ashes of vine twigs, and announced it to the public. After this chemist, most persons who have attended to this object have found gold, but in much less quantity than M. Sage announced. The most accurate analyses have shown no more than two grains, whereas M. Sage had spoken of several ounces in the quintal. The process for extracting gold from the ashes consists in fusing them with black flux and minium.

"Scheele obtained manganese in the analysis of vegetable ashes.

"Lime constantly enough forms seven-tenths of the fixed residue of vegetable incineration. Next to lime, alumine is the most abundant earth in vegetables, and next magnesia. Siliceous earth likewise exists, but less abundantly; the least common of all is the barytes. *Chaptal's Elements of Chemistry*, Part iv. § 3. art. 15.

See Salts, Sulphur, Iron, Lime, in *Elements of Chemistry*. See the *Matrix of Diamonds*; see Chaptal, vol. iii. Part 4. § 5. art. 3.

Digestion. weight may be owing entirely to some dissolution of the solid parts, and the consequent extrication of the gaseous fluids (A).

"Before we had acquired a knowledge of the constituent principles of water," resumes Chaptal, "it was impossible to explain or even to conceive the growth of plants by this single aliment. In fact, if the water were an element, or indecomposable principle, it would afford nothing but water in entering into the nutrition of the plant, and the vegetable would of course exhibit that fluid only; but when we consider water as formed by the combination of the oxygenous and hydrogenous gases, it is easily understood that this compound is reduced to its principles, and that the hydrogenous gas becomes a principle of the vegetable, while the oxygen is thrown off by the vital forces. Accordingly we see the vegetable almost entirely formed of hydrogen. Oils, resins, and mucilage, consist of scarcely any thing but this substance; and we perceive the oxygenous gas escape by the pores where the action of light causes its disengagement."

But though water constitute the aliment of plants, we must not suppose that it is the aliment of these alone: the leech and the tadpole* are nourished by water, and many animals have no other food. "Rondelet cites a great number of examples of marine animals which cannot subsist but by means of water by the very constitution of their organs. He affirms, that he kept during three years a fish in a vessel constantly maintained full of very pure water. It grew to such a size, that at the end of that time the vessel could no longer con-

tain it. He relates this as a very common fact. We likewise observe the red fishes which are kept in glass vessels, are nourished, and grow, without any other assistance than that of water properly renewed †."

The ingenious Borelli, who knew that plants and several animals subsisted wholly by water and air, was likewise of opinion that some animals lived upon sand. He could discover nothing but sand in the stomachs of many testaceous animals that live in the water, and particularly in the stomachs of the smaller kinds that live buried in the sand of the sea. He could not conceive what else could be the food of those small fishes or worms which penetrate the substance of the hardest rocks, and form excavations that always bear a proportion to their bulk. He had regularly found that the stomachs of swans which he had examined were full of sand; and, recollecting the pebbles in the gizzards of fowls, he was led to infer that these substances were somehow dissolved in a gastric juice, and served to nourish the harder parts, as the shells, the feathers, and the bones (B). These sentiments, on a slight view, might not be unnatural. From observing children of depraved appetites swallowing sand, ashes, and cinders; from having sometimes met with sand in the stomachs of wild ducks; from the usual faces of the earth-worm; and from the dissection of several toads dug up in a garden, in whose stomachs we could see nothing but a quantity of earth, with pieces of coal, stone, and of slate, that had accidentally happened to be mixed with it (C), we long entertained a similar opinion with this celebrated author: but on recollect-

* Chaptal's
Elem. of
Chem.
vol. iii.
part 4.
§ 2. art. 2.

95
Some ani-
mals sup-
posed to
live upon
sand, and
why.

* Surgical
and Physi-
ological Es-
says by Mr
Abernethy.
§ Lib. de
Pisc. lib. i.
cap. 12.
94
Some ani-
mals live
on water
alone.

4 S 2

ing

(A) What follows is from the 33d additional note of Dr Darwin's *Botanic Garden*.

"Dr Priestley obtained air of greater or less purity, both vital and azotic, from almost all the fossil substances he subjected to experiment. Four ounce weight of lava from Iceland, heated in an earthen retort, yielded twenty ounce measures of air.

4 ounce weight of			gave	20 ounce measures of air.
7	—	Lava	104	—
2	—	Basalt	40	—
1½	—	Toadstone	20	—
1	—	Granite	30	—
7	—	Elvair	230	—
4	—	Gypsum	230	—
4	—	Blue slate	20	—
4	—	Clay	830	—
5	—	Limestone spar	1160	—
3	—	Limestone	630	—
3½	—	Chalk	560	—
4	—	White iron ore	410	—
½	—	Dark iron ore	25	—
¼	—	Molybdena	20	—
2	—	Stream tin	40	—
2	—	Steatites	26	—
2	—	Barytes	80	—
4	—	Black wad	75	—
3	—	Sand stone	700	—
	—	Coal		—

* In this account the fixed air was previously extracted from the limestones by acids, and the heat applied was much less than was necessary to extract all the air from the bodies employed."

(B) A similar inference was made by Mr Burt upon opening the stomach of the pangolin of Hindostan. See PANGOLIN.

(C) The third ventricle had a strange body fastened to its interior membrane. This body was composed of a hard membrane, in which there was gravel inclosed. Gefner says the chamois is accustomed to swallow gravel to clear his tongue and throat from the phlegm, which is apt to cover them, and destroy the appetite. *Anat. Description of the Chamois or Gemp, by the French Academy.*

Digestion. ing that many substances which enter the stomach are not nutritious; considering the balls of hair and of feathers which the carnivorous animals return, and that quantity of faecal matter which is discharged by the intestines; having frequently experienced that a sense of fulness removes hunger, and observed persons as it were by instinct pressing on the empty stomach with their hand—we began to suspect that the swallowing of sand, and a number of other indigestible substances, might not be to nourish but to prevent some cravings of the stomach, and that these cravings were in part occasioned by a deficiency of the usual pressure which it receives from the neighbouring parts. In this opinion we were more confirmed, by hearing it was customary among some of the tribes of the north of Asia to repel or mitigate the attacks of hunger by placing a board over the region which is called epigastric, and compressing it gradually by means of cords as the stomach collapses; and by learning afterwards, on a further inquiry, that a similar practice, and from similar motives, was likewise common with some individuals in this country; who, to alleviate the sensation of hunger, straiten the epigastric region with their handkerchief. This practice, however, being often impossible with the brute kind, instead of bringing the neighbouring parts to press on the stomach, they are obliged to distend the stomach, and to bring it to press on the neighbouring parts. Of the two ways of producing this pressure, the last is certainly the most natural. Senebier has supposed that distension of the stomach is the cause of the secretion of the gastric liquor; but how well or ill his opinion may be founded, daily experience permits not a doubt, that, in order to satisfy the calls of hunger, the stomach requires not only to be nourished, but to be filled, or at least to have something like a sense of fulness; and this may probably be one reason for those balls which are found in the stomachs of the chamois, which likewise swallows sand, and in the stomachs of the cow, the sheep, and of the horse, “when they do pass away the winter in snowy mountains, where they can find no grass” (D).

96
Use of
balls or
sand in the
stomach.

97
The organs
of digestion
in the ve-
getable.

From this general view of the food, the natural transition is to those organs by which it is prepared. As all plants are fed on nothing grosser than liquids, we see the reason why they are all nourished by absorbents, and why, instead of one common alimentary canal, they are furnished with a number of capillary vessels, which by their action assist the living power in moving the fluids along the trunk, the branches, and the leaves.

These fluids are observed to move between the different ligneous circles, and the more copiously as the wood is younger or the nearer the circles are to the bark. In the circles themselves, it has been remarked that the sap vessels, from being empty during a great part of the growing season, have been called air vessels; that they are formed of spiral fibres, adapted to some peristaltic motion (E); and it is plain, that by this structure they are well fitted to propel their contents, whether water or air, upwards or downwards, backwards or forwards, according to the different positions of the plant.

Besides the particular action of the vessels, a general concussion is received from the movement of the waters or winds, which serves as an exercise; a general dilatation is occasioned by both moisture and heat; and a general contraction by dryness and cold, which produce a motion something similar to that of the thorax †.

In the springing season the sap ascends through the empty vessels before the leaves begin to appear. When the vessels are filled through their whole extent, the buds swell, the leaves spread, and the flowers blow; the evaporation from the surface is increased; the sap is diminished by the absorption; the succiferous vessels now cease to bleed (F); and the roots being unable to supply the waste, the rains and the dews enter by the trunk, the branches, the leaves, and the petals of the flowers. When the evacuations are immoderately increased by excessive heat, or preternaturally obstructed by the plucking of the leaves, by too much humidity, or other causes which prevent perspiration, the plant soon either sickens or dies. The chyle, which is formed in the sap vessels, has generally something of a saccharine taste.

Considering the forms of animal food, we may naturally expect in the animal kingdom a greater variety of those organs employed in digestion. Most animals have indeed, like the vegetable, both inhaling and exhaling vessels, by which some of their fluids are absorbed, and evacuations regularly carried on. Except, however, in those animals which subsist by liquids, these vessels are of little importance in receiving food or ejecting what is faecal from the system. In these animals the absorbents terminate in a hollow viscus, which is called the alimentary canal, where the fluids undergo a preparatory change, and are partly reabsorbed for assimilation. In all others the food enters by a proboscis (G), or by an aperture which is called the

(D) Bartholine, quoted by the French Academy, thought that these balls were composed of the hair which the cows lick from their skin, or of the wool which the sheep eat. But the horse does not lick himself, and many of these balls seem to be composed of ligneous fibres. The balls which are found in the chamois are called by Velschius *German bezoar*. See *Anat. Description of Chamois or Gemp*, by the French Academy.

(E) “The superior part of the intestine, which contained about thirteen inches, had a very particular structure; for, instead of the ordinary circumvolutions of the intestines, the cavity of this was transversely interrupted with several separations, composed of the membranes of the intestine folded inwards. These separations were near half an inch distant from each other, and turned round like the shell of a snail or of a staircase with an open newel.” *Anat. Description of the Sea-fox*, *ibid*. These membranous folds running spirally, are not uncommon in the alimentary canals of animals.

(F) This happens in a great many plants.

(G) Every person may have an opportunity of seeing a proboscis in a number of those winged insects which extract juices from plants. It is very easily discernible in the butterfly. In this insect it is a fine moveable tube,

Digestion. the *mouth* : this mouth is properly the entrance of the alimentary duct. It is very generally furnished with a tongue (η), which is usually assisting in deglutition; and if the food be of that nature to require cutting, tearing, or grinding, it is likewise furnished with the proper instruments (ι) for these operations. When the food is testaceous or some hard vegetable substance, and these instruments not in the mouth, something similar may generally be expected in a more remote part of the canal. The crab and the lobster have accordingly grinding teeth in their stomach, and granivorous fowls have a powerful gizzard lined with a thick corneous substance. It possesses the compressing force of the jaws; and small pebbles which the animals swallow serve it for teeth.

101
Food triturated in the mouth or stomach.

This in the parrot was observed by the gentlemen of the French academy. It has since been observed in rooks, macaws, cockatoos, and others: and Mr Hunter, to whom physiology is so much indebted, discovered, that the male and the female pigeon secrete in their ingluvies a certain liquor for feeding their young; and that most kinds of what have been thought ruminating birds do very often in expressing their fondness regurgitate their food. Yet both this and another species of regurgitation which is very common with those animals that swallow indigestible substances with their food, should be carefully distinguished from rumination.

104
Rumination of birds.

To the ruminating kinds the diluting sac is by no means peculiar. The porpoise has one, though it does not ruminate; and many of those animals which have none, as the rat, the hog, and the horse, have a part of the stomach covered with a cuticle, and which must therefore principally serve as a reservoir. The gullets of several fishes and serpents are sacs of this kind. It frequently happens that a part of their prey is projecting from the mouth, while another part fills up the gullet and gradually descends, to be reduced in the solvent below. So very dilatable are the stomachs and gullets of some animals, that serpents have been often seen to swallow whole animals which, prior to the gorging, were larger than themselves; and many polypes, and even some of the louse kind, will, by swallowing food, more than double their own bulk.

105
Part of the stomach serves as a reservoir.

Applying *stomach* as a general word to the different ventricles of the canal, we may here observe, that every species of animals which ruminate have two stomachs, or at least two divisions in one; that some have three, as the gazella; and some four, as the cow, the dromedary, and the sheep: but it must not be supposed that the number of stomachs is any proof of a ruminating power. It was said already that the porpoise has two; the porcupine has three divisions in one; and the singular cassowary, although it be found to have four stomachs, does not rumi-

106

Number of stomachs.

Besides mere trituration or grinding, the solid food will often require to be mixed with some additional liquid (κ). In those carnivorous animals which chew, this liquid during the time of mastication flows into the mouth from certain glands placed in the neighbourhood. In some species of the ape kind a previous dilution takes place in two pouches situated on the sides of the lower jaw. In granivorous birds this dilution is very usually performed in a sac (ι), which is a dilatation of the canal; and the food being macerated there by the glands or exhaling vessels, gradually passes down (μ), as is needed, to be triturated and farther prepared in the stomach. In the ruminating kind the dilution is performed in a similar manner: but these having no muscular stomach fitted for grinding, instead of descending the food is brought up again into the mouth, and is then after the proper mastication sent to the stomach. If the food require no mastication, it is sent directly that way at first: a circumstance which shows a curious discernment with respect to foods, and proves that their alimentary canal is subject to the action of voluntary muscles as far as the stomach. Some of those birds which have a diluting sac or ingluvies seem likewise to ruminate.

102
In what manner diluted

103
In different animals.

tube, possessing a great variety of action. It serves for a hand, a mouth, and a gullet; and when not extended in search of food, it is coiled up in circular folds. The elephant has both a mouth and proboscis, and this proboscis is one of the most singular of living organs.

(η) The crocodile has no tongue; the ostrich, the seal, and some others, have forked tongues; the cormorant has a double tongue; some, like the eagle, have a cartilaginous tongue; some, like the porcupine, have it toothed. We have found a bone in the tongue of a goose; the tongue of theameleon is a hollow trunk like a proboscis; the tongue of the frog is forked and long—it is rolled up in the mouth, and originates from the fore-part of the lower jaw. In some the tongue is the organ of taste; in others, the instrument for seizing their prey. In distinguishing foods most animals rely chiefly on smell.

(ι) These instruments are corneous, bony, or calcareous; they are teeth or bills; their situation is the tongue, the jaws, the palate, or the stomach. Many teeth seem intended only for attack or defence, for seizing, killing, or retaining the prey. This is remarkable in the fangs of serpents, and in the large tusks of the elephant, the barbiroussa, and some other animals, where they have some resemblance to horns, and project from the mouth. The philodotus and ant-eater have no teeth; the larvæ of insects have generally two, which are placed externally, and cut like a forceps.

(κ) There are many persons whose tongues and mouths are naturally dry, and when they swallow a piece of bread must call for water or some other moistener. This complaint is even sometimes general in a family, and is propagated like an hereditary evil through its different branches. Cockatoos and parrots have likewise dry mouths.

(ι) The bustard has no sac of this kind; but the œsophagus is remarkable for the largeness of its glands.

(μ) In the ostrich the œsophagus passes down and returns, and the crop opens from below upwards into the gizzard.

Digestion. ruminant; nor, although granivorous, is any one of the four a gizzard.

107
Reservoirs
of water
in the pe-
lican and
camel.

Somewhat different from these expansions which we have been mentioning as existing in the first part of the alimentary canal, is a sort of pouch (N) which hangs from the neck and the lower mandible of several birds, and which, like the two pouches of apes, may be used either to macerate the food or to carry provisions from a distance to their young. The pelican, a native of warm countries, employs this pouch sometimes to carry a quantity of water; and another native of the same countries, we mean the dromedary, was observed to have at the top of the second of the four ventricles a number of square holes, which being the orifices of as many cavities between the membranes which compose the ventricle, reminded the gentlemen of the French academy of those large reservoirs of water which Pliny mentions to be in camels; and for which, according to his story, their guides have opened them sometimes in cases of extreme thirst.

108
The gastric
juice.

We come now to one of the principal agents in digestion. Independent of the fluids which mingle with the food in the mouth, the gullet, or macerating sacs, there is one denominated the *gastric juice*, and which, either by itself or along with others from the aliments or system, acts in some measure as a solvent. It is secreted from large glands at the entrance of the gizzard, from vessels or glands in the coats of the stomach, and perhaps most plentifully near the pylorus: it powerfully resists the putrefactive fermentation; it coagulates milk and the white of an egg; it dissolves food even when inclosed in metallic tubes; and when life ceases, it acts frequently on the very stomach from which it was secreted. Its taste, its colour, and its solvent powers, are different in different classes of animals. It seems to be modified according to the age, the health, the habit, and the different aliments on which they live. The sick and the child are incapable of digesting the food that is proper for a healthy man. The hawk kind, after loathing bread and throwing it up without any change, can be gradually brought to take it for food; and Gassendi has mentioned a certain lamb which, being fed on bread, cheese, and on flesh, refused afterwards to taste grass*. But what is most surprising in the gastric juice is, that it spares all living bodies, as those worms which exist in the stomach, and the stomach itself while it is alive; and it differs otherwise from a chemical solvent, in that it has an assimilating power, and reduces all substances, whether animal or vegetable, on which it acts, to a certain fluid of determinate properties, which is called *chyle*.

* Borelli de
Nutritione
Animal.
prop. 194.

109
The bile
and pan-
creatic
juice.

Besides the gastric, the food again, after passing through the stomach, is mingled with a greenish saponaceous liquor, which is called *bile*, and which flows either immediately from the liver or from a vesicle into which it had regurgitated as into a blind gut; at the same time nearly it is mingled with another resembling the saliva from the pancreas or sweet bread; a gland or glands whose place is supplied in a great ma-

ny fishes by a number of vermicular appendages to the stomach.

In short, from one extremity of the alimentary canal to the other, fluids are perpetually flowing into its cavity from glands, vessels, or organic pores; and the membranes constantly secreting a mucus to protect themselves from the acrimony of their contents. This acrimony must often be considerable near to that end of the canal where the faeces are discharged; for as the first part of the canal has generally one or more dilations which are called *stomachs*, and secretes at least one fluid which is strongly antiseptic, so the last part has generally appendages which are called *cæca*, where the food always remains for some time, and where, from the quantity of animal matter that happens to be mixed with it, it becomes putrescent. The office of the cæca is sometimes supplied by the largeness and convolutions of the colon (O); to which gut the ileum cannot, when it enters laterally, so easily communicate its peristaltic motion. As the stomachs were the receptacles of the food when it entered, the cæca are receptacles of the fecal matter before it be discharged. They are of various forms and capacities; they are often larger than the stomach itself; are often composed of proportionally thin and transparent membranes; and from their contents have often a colour somewhat resembling that of the gall-bladder. Their number is different in different animals. Some have but one. The birds which have them have generally two; the bustard has three; and Swammerdam has dissected insects which had four. As some stomachs have a number of folds which hang pendulous within their cavity, and increase their surface, so have often the cæca as well as some portions of the canal. The cæcum of both the rabbit and the hare is curiously formed. It is large and beautiful; it is rolled up like a cornu ammonis; it has the like outward appearance; and a fold running spirally is observed within. The animals which live on vegetable food have usually the greatest length of the canal, and the greatest number of stomachs and of cæca: yet the cassowary, which has no gizzard, has no cæcum; and the polype, which is said to be all stomach, is properly speaking rather all cæcum.

To see more fully the process of digestion, we must not overlook that general and organic action which takes place through the whole alimentary canal. The power of mastication exerted in the mouth is obvious to all. But the force of some stomachs has till very lately been known to few; we allude here to that of the muscular or gizzard kind: for Abbé Spallanzani has divided stomachs into three sorts; the muscular, the membranous, and intermediate. The immortal Borelli, who was probably the first that tried the force of the muscular stomachs by throwing into them nuts of filberds, hollow spheres of glass, hollow cubes of lead, small pyramids of wood, and several other very hard substances, supposed that the power exerted by the stomach of the Indian cock (P) was equal to 1350 pounds

(N) A pouch of this kind is observed in our common rook.

(O) The bear, whose intestines are 40 feet long, has nothing resembling a colon or a cæcum.

(P) The original is *gallus Indicus*, which in the writings of Longolius, Gesner, and Aldrovandus, means a bird.

Digestion. pounds weight. The force of an intermediate stomach cannot be so great, and that of a membranous one must be still less. Each seems to have more of the solvent as it has less of the muscular power. The most membranous are assisted by the action of the neighbouring parts, and expell their contents as readily as the strongest. The muscular sort is either wholly or principally confined to certain kinds of birds and of fishes, as nature has meant that the grain or the shells which they use as food should first be triturated before it be subjected to the gastric juice. This comminution takes place in their stomach, because it is plain that had bones or muscles, fully equal to all these effects, been placed in the head, the form of the animal must have been altered, or that equilibrium which it preserves in those fluid elements through which it moves been completely overturned.

114
Motions of
the alimen-
tary canal.

As to the movements of the alimentary canal, the direction of hairs found in the stomachs, and the balls of hair which are thrown up, would appear to indicate a circular motion. The intestinal part has a motion similar to that of a worm, and is called the *vermicular* or *peristaltic*. Here every portion retains its own motion, although it be separated from the rest by ligatures. The stomach of the polype, the gullets of the ruminating kinds, and the cæca, have this motion in different directions at different times; and that observed in the alimentary canal of a louse is, when view-

ed through a microscope in the time of action, amazingly rapid; the stimulating causes employed are the food, the different liquors with which it is mixed, the air, the nerves where they exist, and a portion of heat. Some degree of heat is necessary to every process of digestion both in the animal and vegetable kingdom: what that degree is depends on the nature of the living body; and is various according to its age, its health, its employments, and habits. The ingenious Hunter has mentioned the digestive and generative heats; and those gardeners who are versant in the operations of hot-houses, have on their thermometers the swelling, flowering, and the ripening heats, with a great many others for the several plants which they mean to raise.

Digestion.
115
The kinds
of stimuli
employed.

Among the other causes of digestion some authors have ranked fermentation: and it must be allowed, that something similar to the putrefactive fermentation takes place in the cæca and the lower extremity of the intestine, and that the vinous and acetous fermentations but too frequently occur in our stomach when that viscus is morbidly affected (Q).

116
The vinous,
acetous, and
putrefactive
fermenta-
tions.

Much of the history of living bodies relates to the different degrees of heat, the varieties of soil, and the kinds of food concerned in digestion. The plants grow where the soil and the heat are congenial to their nature; and those which admit of the greatest variety with respect to soil, and the largest range on the

117
Heat ne-
cessary to
digestion.

bird different from the *cocq d'Inde* or Turkey cock. Johnston has called it *gallus Persicus*. See *The Anatomical Description of two Indian Cocks* by the French Academy. *Gallina Indica* is Ainsworth's Latin for the Guinea hen. See *Borelli de Nutrit. Animal. Prop.* 189, 190, 191.

(Q) "It may be admitted as an axiom (says Mr Hunter), that two processes cannot go on at the same time in the same part of any substance; therefore neither vegetable nor animal substances can undergo their spontaneous changes while digestion is going on in them; a process superior in power to that of fermentation. But if the digestive power is not perfect, then the vinous and acetous fermentation will take place in the vegetable and the putrefactive in the food of those animals which live wholly on flesh. The gastric juice therefore preserves vegetables from running into fermentation and animal substances from putrefaction; not from any antiseptic quality in the juice, but by making them go through another process, prevents the spontaneous change from taking place.

"In most stomachs there is an acid, even although the animal has lived upon meat for many weeks: this, however, is not always the case; therefore we must suppose it is only formed occasionally. Whether the stomach has a power of immediately secreting this acid, or first secretes a sugar which afterwards becomes acid, is not easily ascertained: but we should be inclined to suppose from analogy the last to be the case; for animals in health seem to have the power of secreting sugar, as I find in the milk, and sometimes in the urine from disease. The acid prevails sometimes to so great a degree as to become a disease, attended with very disagreeable symptoms; the stomach converting all substances which have a tendency to become acid into that form: the sugar of vegetables, and even sometimes vinous spirits, turning directly into acid.

"To ascertain whether there is an acid naturally in the stomach, it will be proper to examine the contents before the birth, when the digestive organs are perfect, and when no acid can have been produced by disease or any thing that has been swallowed. In the slink calf, near the full time, there is acid found in the stomach, although the contents have the same coagulating powers with those of animals who have suckled.

"Spallanzani gives the opinion of authors respecting digestion; and so anxious is he to combat the idea of its being fermentation, that he will hardly allow that fermentation ever takes place in the stomach. That fermentation can go on in the stomach, there is no doubt. It is often found that milk, vegetables of all kinds, wine, and whatever has sugar in its composition, become much sooner sour in some stomachs than they would if left to undergo a spontaneous change out of the body; and even spirits in certain stomachs almost immediately degenerate into a very strong acid. All oily substances, particularly butter, very soon become rancid after being taken into the stomach; and this rancidity is the effect of the first process of the fermentation of oil. Mr Sieffert has been able to restore rancid oils to their original sweetness, by adding to them their due quantity of fixed air; the loss of which I consider as the first process in this fermentation, similar to what happens in the fermentation of animal and vegetable substances." *Observations on Digestion by Mr Hunter.*

Digestion.

118
One inten-
tion of the
locomotive
power in
living bo-
dies to pro-
cure food

the scale of heat, are the farthest dispersed over the globe. As every soil has usually some regular supply of moisture, the plants that can live upon that supply extend their roots under the surface where their liquid food is the least exposed to evaporation, and meeting there with the constant nourishment which they require, they remain in that situation for life (R). If their trunks be so feeble as to need a support, they creep on the ground, they climb the face of a neighbouring rock, or cling to the body of some of the statelier children of the forest. Their range for food is extremely limited: it is chiefly confined to the small space which happens to be occupied by their roots and branches; yet if any uncommon exertion be necessary, the branches will bend, and the leaves turn to drink of the water that is passing by. If the roots be laid bare, they will again plunge into the earth; if a stone or a ditch be thrown in the way, they will move round or will dip downwards, and spread into the soil on the other side: if there they arrive at one that is unfriendly, they will not enter; but if a favourite earth should be near, though not in their direction, they will twist about, advance as they grow, and at last meet it. In all these cases the prop, the water, and soil, must be necessary; they must also be within a very small distance, otherwise the plants cannot perceive them, or will fail in their languid attempts to approach them.

119
Exerted by
plants.

120
Farther ob-
servations
on the lo-
comotive
power.

It may be considered as a general fact, that wherever food is liberally supplied for a whole lifetime in one place, the creatures which use it have seldom much locomotive power, or much inclination to exercise it in a long continued and progressive line. The curious insect is therefore observed to deposit its offspring in those places where the prospect of genial warmth and of plenty seem to preclude the future necessity of wandering or research; and when this offspring is about to pass into a new state, and the organs foretel that a change or perhaps a variety of food will soon be required, the appearance either of wings or of legs do likewise foreshow that the power of locomotion is to be increased. Even nobler animals in their fetal state, where they live upon one species of food, and where that is afforded in regular plenty, do spread out their roots, adhere to their soil, and become as stationary as the plant itself; and even when that supply is withdrawn, and they are expelled, yet if the state into which they emerge be helpless and feeble, if their organs of digestion have a weak solvent or masticating power, particularly adapted to some easily assimilated food, and if that food be presented either by their parent or nature without their exertion, their powers of locomotion is not great, nor is it exercised in wandering afar. It is when the organs of digestion are

strong, and the appetite inclines to variety of aliment, that they are disposed and feel themselves able to wander in search of it; and that then they may be ready to move at intervals from place to place, when the enemy comes or the spirit prompts them, nature has directed them to solid food, and has given them a large alimentary canal with stomachs, with convolutions, and cæca, where they may lay up provisions for a journey; but afraid to entrust them with too much freedom, lest in their excursions they might wander from the places where subsistence is found, there are two appetites, hunger and thirst, which never fail in a state of health to remind them of their duty.

This variety of food, and the manner in which it is affected by climate, are the cause of the many and singular migrations from spot to spot, from country to country, and from sea to sea: they are the cause of a state of torpor in the hedgehog and the bear, and they partly explain the provident foresight of the ant and of the bee. Animals of great locomotive power, in order to provide for themselves and their offspring, remove to a distant country or climate when they see the signs of approaching famine. Those of less locomotive power, and who are incapable of migrating far, as if warned by heaven, lay up a store for the scarcity to come; or should their food be of that kind as not to be easily preserved for a season, they receive no secret warning to hoard it at the time when it fails, their system becomes susceptible of torpor, and they are enabled to sleep through the storm of trouble and of want. The source of this want is in most instances to be traced to the nature of the plant and insect. The plant which has little heat of its own depends on the sun or some other agent for one of the great causes of digestion. When this agent refuses the necessary heat, the plant must decline; its leaves, its juices, and its fruits must fail. The insect tribe, which had no other food, or which like the plant could not maintain their vivifying warmth, must likewise submit to the same fate. The various animals which live on either the one or the other, according to their several dispositions and characters, retire to their stores, to their dens of torpor, or migrate to a country to which they are led by unseen guides to share in its abundance. Of these last the rail (s) and the swallow are the only two which are sometimes arrested, and which, with the bear, the hedgehog, and the toad, are obliged to remain in the dwellings of torpor till the genial season of warmth and of plenty.

121
Some final
causes of
the torpid
state.

SECT. III. Absorption.

WHEN the food has undergone the first preparation, which is called *digestion*, and the chyle (T) is formed in the

(R) Many of the fat plants live chiefly by the absorption of moisture from the air; and many sea-plants float through the ocean, and having plenty of food wherever they go, they send out no roots in order to search for it.

(s) All the birds on the lakes of Siberia are said by Professor Gmelin to retreat southward on the commencement of frost, except the rail, which sleeps buried in the snow. Account of Siberia quoted by Dr Darwin in his *The Loves of the Plants*.

(T) The chyle of different living bodies has not yet been analysed; in man it is generally a whitish fluid resembling milk, and yielding water, oil, sugar, and a coagulable lymph.

Absorption. the alimentary canal or sep-vessels, it is thence taken up by means of absorption for the use of the system. From the vessels it passes into the whole cellular tissue, composed of vesicles, and closely interwoven with all the vascular part of the plant. From the vesicles or utricles of the cellular tissue it enters the vasa propria and glands, which contain and prepare the fluids and secretions peculiar to the species.

¹²² Farther progress of the food in plants.
¹²³ In animals. In the animal economy it was always supposed that the chyle was absorbed by the ramifications of the red veins spreading on the gut, till the 1622, when Asellius an Italian discovered the lacteals (u) running on the mesentery of a living dog, and printed his account of them in 1627. As he had not traced their course very far, he naturally thought that they went to the liver, which was then imagined to be the organ of sanguification. This opinion, with respect to the place where they entered the veins, continued to be general till 1651, when Pecquet in France published his account of the thoracic duct (x). With great candour this author acknowledged, that he had been led to make the discovery by observing a whitish fluid mixed with the blood in the right auricle of the heart of a dog, which kind of animal it had been customary to dissect alive since the time of Asellius. "This practice of opening living animals furnished likewise occasions (says Dr Hunter) of discovering the lymphatics. This good fortune fell to the lot of Rudbec first, a young Swedish anatomist, and then to Thomas Bartholine (y) a Danish anatomist, who was the first who appeared in print upon the lymphatics. His book came out in 1653, that is, two years after that of Pecquet; and

¹²⁴ The lacteals discovered in 1622.
¹²⁵ Thoracic duct discovered in 1651.
¹²⁶ Lymphatics discovered before 1653.

then it was evident that they had been seen before by Dr Highmore and others, who had mistaken them for lacteals; but (adds Dr Hunter) none of the anatomists of those times could make out the origin of the lymphatics, and none of the physiologists could give a satisfactory account of their use (z)." He had not known that Glisson, who wrote in 1654, has ascribed to these vessels the office of carrying the lubricating lymph from the several cavities back into the blood; and that Frederic Hoffman has expressed the doctrine of their being absorbents very explicitly*.

It was on the 19th of June 1664 that Swammerdam discovered the valves of these vessels; and Ruysch, who had seen them, perhaps very nearly about that time, first gave an account of them in a small treatise which he published at the Hague in 1665.

The best mode of demonstrating the lymphatics we probably owe to the celebrated Nuck, who, as a specimen of that complete system of Lymphography which he meant to publish (A), printed in 1691 his adenography, or description of the glands. In this treatise he not only tells us how he brought them into view, but in his plates represents many of them as filled with his new mercurial injections; a happy invention, which perhaps was suggested by remarking the extreme subtilty of mercury when employed in the cure of venereal infection.

A method by which he inflated these vessels led him to suppose that they took their origin from veins or arteries, either immediately or through the intervention of some follicles (B). The celebrity of his name procured credit to this mistake; and notwithstanding

4 T

the

(u) We learn from Galen, that the lacteals in kids had long before been seen by Erasistratus, who called them *arteries*.

(x) This duct had been seen before by Eustachius. See *Eustach. de Vena sine pari*.

(y) The discoveries of Rudbec and Bartholine were made in the years 1651 and 1652, about which time Jolyffe an Englishman saw also the lymphatics.

(z) Drs Hunter and Monro claim the merit of having found out the true use of the lymphatics. The former says that he taught it in his lectures so early as 1746, and appeals to his pupils for the truth of the assertion. The latter seems to have made the discovery in 1753; and in 1755 published an account of it in a thesis *De Testibus in variis Animalibus*. Before the printing of this thesis, Dr Black told him that the same opinions concerning the valvular lymphatics had been long entertained by Dr Hunter. In 1756 Dr Monro attended Dr Hunter's lectures in London; heard the whole doctrine of the lymphatics very fully explained; and in 1757 reprinted his opinion at Berlin without taking notice of Dr Hunter's, who charges him with plagiarism; and the charge is retorted by Dr Monro.

(A) Lymphographiæ, quod offertur specimen, ubi lectori non ingratum percepero ad alias transiture tum partes, non minus quam hæc lymphaticis ductibus superiientes. *Prefatio ad Adenographiam*.

Nuck had traced lymphatics on the exterior parts of the head and neck, on the membrane of the lungs, on the spaces between the ribs, in the loins, on the diaphragm, on the heart, the spleen, on the liver, the gall-bladder, on the stomach, on the mesentery, on the tunica albuginea of the testes, in the feet, and in the hands. Ita (continues he), ut multiplici experientia et variis partium præparationibus eo usque pervenerim ut integrum lymphaticorum systema a capite ad calcem mihi composuerim, cujus delineationem libenter tecum communicabo, ubi partium nonnullarum hæcenus nondum satis examinarum, Lymphographiam absolverimus. *Anton. Nuck de Inventis novis Epistola Anatomica ad D. D. B. G. Mod. Doct.*

(B) Quidam nervos constituunt vasorum lymphaticorum principia; alii glandulas minores; alii membranas: nec deficiunt qui a tendinosa musculorum parte eadem deducunt. Sed missis aliorum sententiis, dicam modo; varia me hanc circa speculationem molitum fuisse, variis experimentis (irrito licet ordinario conatu) varia tentasse, casuque tandem nonnulla detexisse quæ lucem, hic adterre possunt.

Ante triennium, mundando lieni vitulino intentus, omnique sanguine, aquæ tepidæ ope, jam eloto, copiosum in arteriam splenicam infudi aërem, et, spiritu fortius adacto, non tantum plurimas exiguas in superficie lienis vidi elevari vesiculas, sed ex iisdem vesiculis vasa prodire lymphatica, flatu etiam turgida et lienem perrepantia vidi, et quo diutius arteria fuit inflata, eo majorem notavi vasorum numerum, ita ut, hac arte per inflatum

Absorption. the founder opinion of Glisson, of Hoffman, and some others, the old notion that the veins performed the office of absorbents came so far down as the great names of Haller and of Meckel. The arguments, however, by which it was supported are shown now, and particularly by those of the Hunterian school, to have been injections that were not skillful, observations that were not accurate, and conclusions that were not logical; while the boasted assertion that birds and fishes were without lacteals and without lymphatics, has been disproved by the fortunate discoveries of Mr Hewson and Dr Monro. Excepting, therefore, in the penis and placenta, and in those animals whose veins may be injected from the gravid uterus, the lymphatics seem to perform the whole business of absorption. They contain a fluid that is coagulable like the lymph of the blood, and are called valvular to distinguish them from the arteries that do not admit the red globules. They derive their origin from the cellular membrane, from the different cavities, and from the surface. Some authors say that they have seen them in the brain (c), and these Mascagni has ventured even to describe in prints. That some indeed may exist in the brain, has not been denied; but to believe that they have been found, and to trust assertions which are not countenanced by the observations of skillful anatomists, requires a faith which for our part we do not pretend to. Both they and the lacteals derive their name from the colour of the fluids which they contain. They both empty themselves into the veins; but most of the lymphatics in the human subject, and all the lacteals, first unite in the thoracic duct, which near the heart leads into the course of the circulation.

SECT. IV. *Circulation.*

AFTER part of the food is converted into chyle, and this chyle absorbed by the lacteals, and brought into the course of the circulation, it remains to be distributed

to all the different parts of the system. On this account, Hippocrates speaks of the usual and constant motion of the blood †, of the veins and arteries as the fountains of human nature, as the rivers that water the whole body, and which if they be dried up man dies §. He says that the blood vessels are for this reason everywhere dispersed through the whole body; that they give spirits, moisture, and motion; that they all spring from one; and that this one has no beginning and no end, for where there is a circle there is no beginning (D). In such language was the prince of physicians accustomed to express his vague ideas of a circulation; for so far was he from having acquired accurate conceptions on this subject, that when he saw the motions of the heart, he believed that the auricles were two bellowses to draw in air, and to ventilate the blood.

When after his time anatomy came to be more studied, the notions of the ancients respecting the blood were better defined; and, however chimerical they may seem to us, they were partly derived from dissection and experiment. On opening dead bodies, they found that the arteries were almost empty (e), and that very nearly the whole of the blood was collected in the veins, and in the right auricle and ventricle of the heart. They therefore concluded that the right ventricle was a sort of laboratory; that it attracted the blood from the Cavæ; by some operation rendered it fit for the purpose of nutrition, and then returned it by the way that it came. From the almost empty state of the arteries, they were led to suppose that the right ventricle prepared air, and that this air was conveyed by the arteries to temper the heat of the several parts to which the branches of the veins were distributed.

To this last notion entertained by Erasistratus, Galen added an important discovery. By certain experiments, he proved that the arteries contained blood as well as the veins. But this discovery was the occasion

fluctum vasis lymphaticis vulnus aer immixtus, membrana linealis fere tota lymphaticis ductibus obfessa fuerit visa.

Ab eo tempore conjicere cæpi vasorum lymphaticorum principia ab arteriarum furculis emanare, idque aliquando intermedia vesicula, aliquando deficiente vesicula, immediate ab ipsa arteria venare. *Adenographia curiosa*, cap. 4.

(c) Sed rogare videris, utrum in cerebro etiam vasa occurrant lymphatica? Quamvis ex recentioribus, nonnulli in eorum descriptione satis liberales, eadem concedant et facile admittant: Verum, quod passim observo, systemata in proprio cerebro formant et viscera ex suo placito componunt: ad experimenta enim provocati nihil egregii præstare valent. Nunquam hac in parte, ut ingenue loquar, hæcenus Scopum attingere potui. Interim non negandum censeo aliquando cerebri lymphatica in una aut altera parte fuisse visa; et non ita pridem, anatomicus quidam mihi amicissimus, inter alia inventa, hæc nobiscum, communicat. "Vidi, inquit, lymphaticum in cerebro Bovino, quod examine tuo (ut originem scias et insertionem) erit dignissimum. Non longe a glandula pineali, a qua ramos forte habet, incumbit plexui choroideo, ad infundibuli latera sese extendens." Ante biennium ductum lymphaticum ex pini glandula eodem modo ut aliis glandulis, exeuntem vidi. Ita ut quidem certissimum, et cerebrum suos habere rivulos aquosos, sed nondum distincte, in lucem protrahos. *Epist. Anat.*

(D) *Hippocrat. de Venis.* "Plato, in his *Timæus*, speaks of the heart as a watch-tower completely fortified, as the knot of the veins, and the fountain from whence the blood arises, and briskly circulates through all the members. The blood he calls the pasture of the flesh; and adds, that for the sake of nourishing the remotest parts, the gods have opened the body into a number of rivulets like a garden well stocked with plenty of canals, that the veins might by this means receive their supply of moisture from the heart as the common source, and convey it through all the sluices of the body." The rest of the passage cited by Longinus is as full of nonsense as it well can hold: and indeed Longinus seems chiefly to have admired it for something which had struck him as divine and unparalleled in its tropes, as making the head a citadel, the neck an isthmus, the vertebræ hinges, and the flesh a rampart. See *Longinus on the Sublime*, § 32.

(E) Erasistratus opened dead bodies at Alexandria.

Circulation.

132

Hippocrates

spoke of

the circulation

of the blood, but

his language is

vague.

Hippocrat.

de Morbis,

p. 127.

Hippocrat.

De Cordis.

133

Arteries

discovered

to be almost

without blood

in dead

bodies.

134

Proved by

Galen to

contain

blood in

of living bodies.

Circulation.

¹³⁵ How Galen supposed the blood to pass between the right and left ventricle of the heart.

¹³⁶ Another opinion, supposed to be Galen's, refuted by Vesalius.

¹³⁷ Vesalius roused the attention of anatomists to discover the true passage of the blood between the ventricles.

¹³⁸ The passage discovered, and Galen's opinion revived, by Michael Servetus and others.

of some embarrassment. How was the blood to get from the right to the left ventricle? To solve the difficulty in which his new discovery had involved him, he supposed that the branches of the veins and arteries anastomosed (F); that when the blood was carried to the lungs by the pulmonary vein, it was partly prevented by the valves from returning; that therefore during the contraction of the thorax it passed through the small inosculating branches to the pulmonary vein, and was thence conveyed along with the air to the left ventricle to flow in the aorta (G). This opinion, so agreeable to fact, unfortunately afterwards gave place to another that was the result of mere speculation.—This notion was, that the left ventricle received air by the pulmonary vein, and that all its blood was derived through pores in the septum of the heart.

The passage thro' the septum being once suggested, and happening to be more easily conceived than one thro' the lungs, it was generally supposed the only one for a number of centuries; and supported likewise, as it was thought, by Galen's authority, it was deemed blasphemy in the schools of medicine to talk of another. In 1543, however, Vesalius having published his immortal work upon the structure of the human body, and given his reasons in the sixth book why he ventured to dissent from Galen, he particularly showed how it was impossible that the blood could pass through the septum of the heart. His reasoning roused the attention of anatomists; and every one grew eager to discover the real passage which the blood must take in going from the right to the left ventricle. The discovery of this fell first to the lot of Michael Servetus, a Spanish physician, who published his opinion, and revived the old doctrine of Galen, in 1553 (H). But his opinion did not spread at the time; the book in which it made its appearance contained heresy, and was therefore destroyed by public authority. Fortunately, however, the same discovery was again made by Realdus Columbus, professor of anatomy first at Padua and afterwards at Rome, who printed his account of it in 1559. Many others who were engaged in the same research were equally successful, and Andreas Cæsalpinus even singularly lucky. It appears by his peripatetic questions printed at Venice in 1571, and reprinted there with his medical questions in 1593, that he knew not only the lesser circulation, but had observed that there were times when the blood flowed from the branches of the veins towards their trunks, and that veins swelled

between their ligature and the extremities, and not between the ligature and the heart. From these observations, he necessarily inferred that the veins and arteries anastomosed; and having also contemplated the nature of all the valves which were then known, and had been known since the days of Galen, he ventured to assert that the blood could not return by the arteries to the left ventricle. One should imagine that from such conclusions he must have discovered the true circulation; but he did not. Being a zealous peripatetic, he thought himself bound to maintain with Aristotle that the blood flowed, like the tides of Euripus, backwards and forwards in the same channel; and therefore supposed that it flowed from the arteries into the veins in the time of sleep, and from the veins back into the arteries in the time of waking. The greater circulation, so far as we can learn, was not even dreamed of by this writer. A farther step was yet to be made towards its discovery; and this was reserved for another professor of the Paduan school.

In 1574, Hieronymus Fabricius ab Aquapendente, while he was seeking for a cause to explain the varicose swellings of some veins which had arisen from friction and ligature, he to his great joy and astonishment discovered their valves in one of his dissections: and here again the true theory of circulation seemed almost unavoidable. Yet whoever reads the small treatise *De Venarum Ostiis*, first printed by Fabricius in 1603, will soon perceive that he was as far from entertaining a just notion of the circulation as his predecessors. Notwithstanding all that he saw, he still was of opinion that the blood flowed from the heart to the extremities even in the veins. He thought that the valves were intended by nature only to check and moderate its force. He calls them an instance of admirable wisdom, and mistakes his own awkward conjecture for one of the designs of infinite intelligence. In another respect, it must be confessed that he bore no inconsiderable share in promoting the discovery of the circulation (I). By writing on the valves, the formation of the fœtus, and the chick in ovo, he directed the attention of his pupil Harvey to those subjects where it was likely that the motion of the blood would frequently occur.

Harvey was born at Folkston in Kent in 1578, completed his studies at the university of Cambridge, went to Padua, and was there admitted to the degree of doctor, with unusual marks of approbation, in 1602. He examined the valves with more accuracy than

Circulation.

¹³⁹ The whole circulation very nearly discovered by Cæsalpinus.

¹⁴⁰ Had almost forced itself upon Fabricius ab Aquapendente.

¹⁴¹ At last discovered, and fully demonstrated by his pupil Harvey.

4 T 2

(F) In toto est mutua anastomosis atque osculorum apertio arteriis simul cum venis. *De Ufu*, part 6. cap. 10.

(G) It was the opinion of Galen, that the motion of the lungs and the pulse of the arteries was to cool the blood, and to expel the fuliginous vapour. That he had just ideas of the lesser circulation through the lungs, and of the true nature of the valves, is evident from the passages cited by Harvey, *De Motu Cordis*, Exercit. 1. cap. 7.

(H) The words in which he mentions this discovery are these: "Non per parietem cordis, uti vulgo creditur, sed magno artificio a dextro cordis ventriculo, longo per pulmones ductu agitatur sanguis subtilis." Being born at Villa Nuova, in the kingdom of Arragon, he sometimes called himself Michael Villanovanus, or simply Villanovanus. In the title of all his books he takes the name of *Reves*, which is formed from Servetus, by throwing out the *de* and transposing the five letters that remain. The book in which his discovery was mentioned was printed clandestinely, and intitled *Christianity Restored*. Being first imprisoned at Vienne in Dauphiny, and afterwards allured to Geneva by the treachery of his correspondent and confidant John Calvin, he was, by a servant of that reformer's, accused of blasphemy, and condemned to the flames in 1553.

(I) Almost the whole merit of his discovery is due to the Paduan school, of which Cæsalpinus as well as Columbus was once a professor.

Circulation.

142
The merit
of Harvey
in this
discovery.

143
How the
blood is
circulated

than his master Fabricius; and explained their use in a treatise which he published some time after. It is uncertain when he first conceived his celebrated doctrine of the circulation; but about the 1616 he taught it in his lectures, and printed it in 1628. He was the first author who spoke consistently of the motion of the blood, and who, unbiassed by the doctrine of the ancients, drew rational conclusions from his experiments and observations. His books present us with many indications of a great mind, acute discernment, unwearied application, original remark, bold inquiry, and a clear, forcible, and manly reasoning (κ); and every one who considers the surprise which his doctrine occasioned among the anatomists of those days, the strong opposition that it met with from some, and those numerous and powerful prejudices which it had to encounter from the sanction of time and of great names, must allow it was new, and that the author has from its importance a title to rank in the first class of eminent discoverers ancient or modern.

His discovery showed, that in most animals the blood circulates in arteries and veins, and through the medium of one, two, or of more hearts: that in arteries it moves from the trunk to the branches; and that, meeting there with the branches of veins, it returns in a languid stream to the heart; that the heart communicates a new impulse; that it drives it on to the trunk of the arteries; and that the arteries, by the thickness of their coats, exerting a force, do push it onwards again into the veins.

In every part of this circulating course, there are valves situated where it is necessary; they are meant to prevent the return of the blood; they are at the beginnings of the great arteries, and are found in different places of the veins where their feeble action requires to be assisted.

The veins, before they enter the heart, generally expand into a thin muscular sac, which is called the *auricle*. It receives the blood while the heart is contracting; and when the heart admits of dilatation, contracts itself, and throws the blood into the ventricle.

We have here called the ventricle a heart; though what is usually meant by the heart be a ventricle and auricle; or sometimes a ventricle and two auricles, where the veins approach in different directions, and, without bending to meet one another, expand at two different places. Two hearts are sometimes united, so as in appearance to form but one.

144
In different
animals.

From our having mentioned more than one heart, it will be supposed that the modes of circulation are various. In some animals the heart throws its blood

to the remotest parts of the system (1); in other animals it throws its blood only into the respiratory organs: from these organs it is collected by the branches of veins; and these branches, uniting in a trunk, convey it to an artery, which renews the impulse, and acts as a heart. In a third set of animals, the blood from the respiratory organs is carried by the veins to another heart; and this second heart, united in the same capsule with the first, distributes the blood by the channel of its arteries to the several parts. In the human foetus, and the foetus of those animals which have two hearts, a part of the blood, without taking the passage through the lungs, proceeds directly from auricle to auricle. In amphibious animals, the auricular passage continues open during their life, and is employed, when the breathing ceases, under the water. In many insects, a number of hearts, or expansions which answer the purpose of hearts, are placed at intervals on the circulating course; and each renews the impulse of the former, where the momentum of the blood fails. In the *Sepia Loligo* the two separate parts of the gills are each supplied by a heart of its own: the blood from both is collected into one; which, by two arteries opening at two different parts, send it at once to the opposite extremities. In numbers of animals, the heart, like the stomach, is in the extremity opposite to the head.

After the discovery of the circulation, the most interesting object with anatomists was to demonstrate it in a clear, satisfactory, and easy manner. Harvey, to show it with every advantage that he could think of, was obliged to open animals alive: but whether the animals were dead or alive, the larger branches of the veins and arteries were only to be seen, and even these but in certain cases, when they happened occasionally to be full of blood. That admirable method, which is now observed in demonstrating the course of the circulation, we owe to the great anatomists of Holland who flourished in the last century. About 1664, Regnier de Graaf invented the syringe, which is now used; and, accompanied with a print, published an account of it in 1669. His injection was usually a thin fluid of a blue green or some other colour; this injection transfused through the vessels, allowed them to collapse by its general diffusion, and broke out through the first opening that happened in its way. A fluid which hardened after being injected, and which preserved the vessels distended, was a happier contrivance. This at first was either melted tallow or wax, of a colour suiting the taste of the anatomist. So early as the year 1667, the celebrated Swammerdam injected the vessels running on the uterus with ceraceous matter; and, jealous

Circulation.

145
How the
circulation
is demon-
strated in
dead bodies.

146
Discovery
of De
Graaf.

147
Of Swam-
merdam.

(κ) Dr Hunter says, that "none of his writings show him to have been a man of uncommon abilities. It were easy to quote (he says) many passages which bring him nearly to a level with the rest of mankind. He lived almost 30 years after Asellius published the *Lacteals*, yet to the last seemed most inclined to think that no such vessels existed. Thirty hours at any time should have been sufficient to remove all his doubts; but this subject taken up in self-defence (continues the Doctor) grows unpleasant." Dr Hunter was here thinking of his own discovery when brought in comparison with that of Harvey's. When this comparison was less immediately in view, he says that "Dr Harvey, as appears by his writings, was certainly a first-rate genius for sagacity and application; and his name is deservedly immortal on account of the many observations and improvements he made in anatomy and physiology." *Dr Hunter's First Introductory Lecture.*

(1) We never exclude the action of the arteries.

Circulation.
 148 **Of Ruysch.** jealous lest another should claim the merit of such an invention, he transmitted preparations, accompanied with plates, and with a full account of his method, to the Royal Society of London in 1672. Soon after, his friend Ruysch acquired such skill in the art of injecting, that he has not been surpassed by any since his time. He discovered vessels in many parts where they were not supposed to have had an existence; and, contrary to the opinion of the great Malpighi, he showed that even many of the glands were entirely vascular; and that what had been supposed excretory ducts, deriving their origin from some follicle, were but terminations of arteries continued: yet even Ruysch could not exhibit in all cases the course of the vessels so well as we do now. Another discovery was yet to be made for demonstrating their small capillary branches running through a part. This was reserved for the very ingenious Dr Nicholls of London; who invented the method of corroding the fleshy parts with a menstruum, and leaving the wax, as it was moulded by the vessels, entire.

149 **Of Dr Nicholls.**
 150 **Circulation not universal in living bodies.**
 151 **None in plants nor in some animals.**
 From these researches, which evince circulation to be a function so general among animals, some are disposed to think it takes place in all living bodies. But notwithstanding the fashionable language of circulating fluids, of veins, arteries, and even of valves in the vegetable structure; yet nothing performing the office of a heart, and nothing that seems to conduct fluids in a circular course, has been found in plants. In the vegetable kingdom, the chyle is distributed to all the parts from the numerous vessels which convey the sap: and these vessels, being fitted by their structure to carry the sap either downwards or upwards, from the branches to the roots, or from roots to the branches; is the reason why plants inverted in the ground will send forth roots from the place of their branches, and send forth branches from the place of their roots. Even a similar distribution of the chyle takes place in some animals. In the human *tœnia*, in the *fasciola hepatica* of sheep, and in most polypes, the chyle, without a circulating system, is conveyed directly to the different parts from the alimentary canal. The taste for circulation may at

last subsist. Till the business of absorption from the intestines was, of late, fully secured to the lacteals, we were wont to have also learned dissertations upon a circular motion of the bile. The jaunt which it took was not very cleanly; but it was social: it went with the feces down the intestines, and returned with the blood in the meseraic veins.

Besides the circulation, another circumstance respecting the blood, which sometimes has engaged the thoughts of physiologists, is the colour which it has in most animals. The late Mr Hewson was of opinion, that the lymphatics, with the spleen (M) and the thymus, contributed greatly to the formation of the red globules. He was seemingly led to entertain this opinion from that attention to the lymphatics which made him ascribe much to their power, and from seeing red particles in the absorbents which rise from the splenic and the thymic gland. His reasoning, however, though very ingenious, is not conclusive. The celebrated Nuck, who had often observed a reddish fluid in the lymphatics, assures us, without any hypothesis, that such an appearance was always preternatural; and was either occasioned by a scarcity of lymph, or by some irregular and too much accelerated motion of the blood (N).

It is well known that the blood receives its vermilion colour in passing through the lungs; that animals with lungs have the blood redder than those which are seemingly without that organ; and that the colour, as well as the heat, is in proportion to the extent and perfection of the lungs. It has also been observed, that oxygenous gas is absorbed in respiration; and been proved by experiment, that the red globules of the blood, and the red only, contain iron. It thence would appear, that the colour is owing to iron calcined by the pure air, and reduced to the state of a red oxid. From this manner of conceiving the phenomena, says Chaptal, we may perceive why animal substances are so advantageous in assisting and facilitating the red dye (O).

A great variety of experiments have shewn how much the colour and consistence of the blood is altered by

(M) Before we can expect to arrive at a proper knowledge of the spleen, we have first to examine its form, its proportion, its situation, its numbers, and its different circumstances in different animals; and as yet this has been done only in a few cases. The gentlemen of the French Academy found, that in the demoiselle it was like the liver, in the bustard like the kidney of a quadruped, in the chamois round and flat, in the lynx narrow and long, in some animals proportionally large, in others proportionally small; that in the gazella it was joined immediately to the stomach, without a *vas breve*; that in the castor, again, it was attached to the left side of the stomach by eight veins and arteries, and as many *vasa brevia*; that in the otter it was fastened to the epiploon, in the Canada stag to the great ventricle; and they found that in the porcupine and sea-fox it was double. Since their time Dr Monro has observed two large spleens, one attached to the small and the other to the large curvature of the stomach of the *squalus squatina* or angel-fish, whose blood contains few red particles; and the same eminent physiologist found in a sturgeon no fewer than seven, one of the size of a dried horse-bean, and the rest about the bulk of a dried garden-pea.

(N) *Interim non diffiteor vasa illa lymphatica lympham subinde vehere rubicundo colore tinctam, loturæ carnis ad instar se habentem. Hoc autem nunquam contingit in statu naturali, verum post nimium et irregularem sanguinis motum. Vel in quibus humidum (ob defectum alimenti) deficit, qua occasione plerique humores vitiantur, et colore preternaturali tinguntur. Quid mirum itaque hisce in casibus et lympham reddi sanguineam. Adenographia, cap. 5.*

(O) *Chaptal's Chemistry on the Properties of the Blood.* The physiologists of last century accounted for the red colour in another way. *Rubedo sanguinis* (says Verheyen) pro magna parte procedere videtur ab alimentorum particulis salinis ac sulphureis seu oleosis exaltatis. Cujus non leve indicium est, quod lixivium ex cineribus vulgari modo paratum notabiliter rubeat, in quo, præter aquam, vix aliud quam sal et sulphur reperibile est:—et lac (quod

Circulation.
 152 **A supposed circulation of the bile.**

153 **Opinions concerning the red colour of the blood.**

154 **Respiration changes the colour of the blood.**

Nutrition

155
Action of
the vessels
changes
the colour
and quali-
ties of the
blood.

156
Great va-
riety of this
action.

by the mere action of the vessels; and this discovery has enabled us to conjecture with more certainty than we did formerly, why in infants and phlegmatic persons the blood is paler, in the choleric more yellow, and in the sanguine of vermilion red. It explains likewise, in some measure, why the blood varies in the same individual, not only with regard to the state of health, but likewise at the same instant; and why the blood which circulates through the veins has not the same intensity of colour, nor the same consistence, as that of the arteries; and why the blood which flows through the organs of the breast differs from that which passes languidly through the viscera of the lower belly. This power of the vessels over the blood will bring us also to the true cause why the vessels vary in the density of their coats and in their diameters; why they are sometimes convoluted in a gland; why they sometimes deposit their contents in a follicle; why they are sometimes of a spiral form; why the branches strike off at various angles; why they are variously anastomosed; why they sometimes carry the blood with dispatch and sometimes slowly through a thousand windings. By those means their action is varied, and the blood prepared in numerous ways to answer the ends of nutrition and secretion.

SECT. V. Nutrition.

157
Food chan-
ged by dif-
ferent or-
gans.

NUTRITION is the function which assimilates the food in the several parts, and which finishes the process already begun in the stomach, in the lungs, and the vascular systems. In perfect animals some of the stages of this process are distinctly marked. The chyle, which has some resemblance to milk, is the work of the alimentary canal: it undergoes some new changes by the action of the lacteals and of their glands, when they exist. In the course of circulation it passes along the respiratory organs, and is mixed with oxygen or some other gas; by this mixture, the consequent heat, and the action of the vessels, it is turned into blood. The blood, when examined, spontaneously separates into three parts; an albuminous part or a serum, a coagulable lymph (P), and red globules. The two first are analagous to the white parts of an egg, by which the chick in ovo is nourished; the globules have some resemblance to the yolk, which serves afterwards as food to the chick in the more advanced period of life. The three parts contain each a variety of principles which are originally composed of gases: these principles, conveyed through vessels of various forms, of various diameters, and with various degrees of motion and of heat, and all along varying as

they pass, arrive at last on the confines of the parts which are wrapt up in a cellular tissue or some other membrane. The tissue or membrane gives a new change; the parts nourished perform the office of secreting organs; and as the action of the vessels is varied according to the place to which they are tending and the parts which they enter, we partly see the manner in which bone, muscle, cartilage, and nerve, are all secreted from a common mass.

In worms and polypes, the function of nutrition is after digestion carried on almost entirely by the cellular tissue; and in plants by a tissue cellular and vesicular. In all living bodies the cellular tissue, besides giving a form to the parts, and besides preventing friction and cohesion, certainly performs some important office. Many have thought it the organ of nutrition; and it surely is one of the organs employed in assisting to assimilate the nutritious fluid. But it should be remembered, that all the parts of the living body are assimilating organs; that each part assimilates for itself; and that the stomach, the respiratory organs, the vessels, and nerves where they exist, are assistant to the whole and to one another.

It is singular how any should have imagined that the nerves are peculiarly the organs of nutrition, or that growth should be owing to the addition of some organic and vivifying particles pre-existing in the food. These physiologists have not demonstrated the existence of nerves in all living bodies; and these organic and vivifying particles have as yet been discovered but in their fancy. Dr Monro has condescended to prove, that the limb of a frog can live and be nourished, and its wounds heal, without any nerves: and Mr Hunter has given many curious instances of a living and nutritious power in the blood.

In plants and animals, the assimilating power has always certain limits prescribed to it: its influence is very generally confined to the sort of food congenial to the species: and its strength is varied according to circumstances; as the age, the habits, and the state of health. Those which are young assimilate faster than those which are old; and one species, which may partly be owing to the nature of their food, will assimilate much faster than another. Certain worms that feed on animal and vegetable substances will, in 24 hours after their escape from the egg, become not only double their former size, but will weigh, according to Redi, from 155 to 210 times more than before. Most oils are of very difficult assimilation; and those which are essential will often resist the long continued and the varied action of the living organs; will mingle with

(quod sulphure abundare probat butyri inflammabilitas), si coquatur cum sale lixivioso, colorem plane sanguineum contrahat; quod similiter decoctum ex aqua, sulphure vulgari, et sale tartari ad confectionem lactis sulphuris paratum rubescat; quod cerevisia et quædam alia diuturniori coctione ruborem contrahentia, iisdem principiis scateant, &c.

Ad intensiorem sanguinis rubedinem multum quoque contribuunt particule nitrosæ, quæ beneficio respirationis ex aëre in sanguinis massam jugiter transmittuntur: siquidem color ille coccineus magisque splendens quo passim sanguis arteriosus a venoso distinguitur, in pulmonibus jugiter alitur ac renovatur.

Rubedinem autem hoc modo facile excitari posse amplius confirmatur ex eo, quod vitrum, etiam centum librarum capax per unicam unciam spiritus nitri rarefacti, omnino repletum appareat materia rubescente. Verheyen de Sanguificatione. Verheyen uses the word sulphur for any inflammable substance.

(P) Senac was the first who discovered this lymph.

Secretion. with the parts, and, undecomposed, communicate their flavour.

162
Assimila-
ting power
of flame.

An assimilating power is not peculiar to living bodies; it is observed in ferments and contagion, and is so obvious with respect to flame which is neither living nor organized, that whole nations who have seen it feeding on inflammable substances, have been disposed to think it was animated, to call it the principle of life itself, and to pay it a kind of religious homage as the proper emblem of that Being by whom the whole universe is upheld.

In living bodies nutrition is only a species of secretion.

SECT. VI. Secretion

Is a function in which a part is separated from the whole, and generally with some change of its qualities. In the case of nutrition it was observed, that all parts secrete for themselves; and that some few, as the lungs, the stomach, the vessels, and the nerves, officiate besides for the general use of the whole system.

163
Every
living body
in a state of
constant
waste and
repair.

If all the ingesta were to remain and to be assimilated, the body would go on continually increasing. But living bodies are constantly in a state of waste and repair. In most animals part of the ingesta is carried off by evacuation, without having entered the mouths of the absorbents; part, which enters the absorbents and veins, is thrown off by exhaling arteries or the urinary passage: and experiments with madder prove that the lymphatics, besides originating from all the cavities and carrying back the lubricating fluids, do enter the substance of the hardest bones, and convey particles that had been assimilated back into the blood.

164
An office
not generally
ascribed to the
absorbents.

This office has not been generally ascribed to the absorbents; nor has it been very generally supposed that the blood receives the excrementitious matters of the system, and that one intention of the circulation was either to return them for re-assimilation, or to discharge them by exhaling vessels or by the kidneys. Decayed parts, however, are discovered in the feces evacuated by the intestines, in the clouds, the sediment, and colour of the urine, and by the smell of the perspirable matter. The two last, on certain occasions, and for some time, have often supplied the place of one another; and all the three, the feces, the urine, and perspirable matter, we have reason to believe are remarkably distinguished by two kinds of odour; the one peculiar to the whole species, the other peculiar to the individual. By the perspirable matter which adheres to the ground, and of which the odour is diffused by moisture, the dog not only distin-

165
Sweat and
urine inter-
changed,
and their
odour.

guishes a man from any other animal, but is able to trace his master through a crowd.

The natural evacuations of plants, and of some few animals which feed by absorbents, are all by perspiration or exhaling vessels. The urine in quadrupeds is plants by before emission collected in a vesicle, and thence carried off by the genital organ. In birds, and in a number of fishes, the ureters empty themselves into the rectum, and their contents are evacuated along with the feces.

166
Evacua-
tions of
plants by
exhaling
vessels.

Besides being used to denote the function, the word secretion is sometimes employed for the matters secreted. In this sense there are various secretions. Besides the feces, the urine, and the sweat, and the vapour from the lungs, which are excrementitious, there are secretions which answer useful purposes in the system. Of these the most important and general are the bile, the saliva, the gastric juice, and the pancreatic, which assist in digestion; the lymph and the fat, which lubricate the parts; the mucus, which protects them from acrid substances; the nervous fluid, which forms a very conspicuous link between body and mind; the seminal fluid employed in generation to propagate the species; and the lacteal intended for some while to support the young after they emerge from the fetal state.

167
Some mat-
ters evacu-
ated, some
secreted for
useful pur-
poses.

The saliva is a fluid that mixes with the food in the time of mastication. In man it is secreted from the parotid, the sublingual, and submaxillary glands (Q); it is watery and somewhat viscid; it is found to retard and moderate fermentation: it has sometimes a tendency to form calculi like the urine. By these concretions it incrusts the teeth and sometimes obstructs the salivary ducts. It is the seat of the rabies canina.

168
The saliva.

169
Concre-
tions form-
ed by it.

Upon first examination the gastric liquor seems to possess a solvent power upon animal and vegetable substances without any great preference of affinity. The reason is, it varies according to the nature of the aliment; "it is sometimes acid, sometimes insipid. Brugnatelli has found (says Chaptal) in the gastric juice of carnivorous birds and some others a disengaged acid, a resin, and an animal substance, united with a small quantity of common salt. The gastric juice of ruminating animals contains ammoniac, an extractive animal substance, and common salt. In our time the phosphoric acid has been found disengaged in the gastric juice" of the graminivorous kinds.

170
The gastric
juice.

"The bile secreted by the liver is glutinous or imperfectly fluid like oil, of a very bitter taste, a green colour inclining to yellow, and froths by agitation like the solution of soap. Its constituent principles are water, a spiritus rector, a coagulable lymph, a resinous oil,

171
The bile.

(Q) These glands are very rarely met with in birds. It is mentioned as a singular circumstance in the demoiselle of Numidia, that "in the lower beak, on both sides of the tongue, under the inward tunicle of the mouth, there were found two glandulous bodies, from whence proceeded several lympheducts which opened into the mouth, and there discharged, being squeezed, a white and viscous humour. There were two of them towards the upper part a great deal bigger than the others. The tongue was fleshy at top and cartilaginous underneath, as in hens.

"The tunicle of the palate was rough, with a great number of little nipples and of hard and membranous points. It likewise included a glandulous body, which shot forth two great ductuses opening into the mouth. There was discovered a great quantity of other little glands at the sides of the larynx, which had also some lympheducts." *Anat. Descript. of the Demois. of Num. by the French Academy.*

Secretion.

oil, and soda. The resinous part differs from vegetable resins; because these do not form a soap with fixed alkalis; because they are more acrid and inflammable; and because the animal resin melts at the temperature of 40 degrees, and acquires a fluidity similar to that of fat. From fat it differs in not being soluble in cold alcohol, in which respect it approaches to spermaceti, which alcohol cannot dissolve without heat.

172
Concre-
tions form-
ed by it.

Bile, like other soaps, removes spots of oil from these substances to which they are adherent; when its passages are obstructed the motion of the intestines becomes languid. It is neither alkaline nor highly putrescent. In putrefaction it yields something of a musky colour; the fossil alkali precipitates from it a green sediment; and with distilled vinegar it produces a mixture neither acrid nor sweet. Like saliva and urine, it has a tendency to form concretions which are called *biliary calculi* or *gall-stones*. They are sometimes found of an irregular texture, of a brown, black, yellowish, or greenish colour. They sometimes consist of transparent chryselline laminæ, like mica or talc, and are sometimes radiated from the centre to the circumference. They are always inflammable, of a more solid consistence than the generality of animal oils, and resemble spermaceti both in their solidity and chrysellization; they are soluble in ardent spirit when assisted by a moderate heat: the warm solution, when filtered, deposits by cooling a number of laminated white brilliant crystals, such as Poulletier de la Salle found in the bile, and which have been compared to the salt of ben-zoin, the concrete acid of borax, and to spermaceti. Many of their characters indicate that they are a substance of the same nature with the last mentioned. Fourcroy found that the substance of which these crystals are composed exists not only in the crystallized gall-stones or bile; he observed it to a very considerable degree in a human liver which had been exposed to the air for several years, and had lost its volatile parts by putrefaction. He detected it also in a saponaceous form in bodies which had been many years buried under ground; and lately Dr Pearson of London has artificially converted the muscular fibre into a substance of a similar kind, highly inflammable, and resembling spermaceti (R).

173
Muscular
fibre con-
verted into
fat.174
The pan-
creatic
juice.175
The lymph.

The pancreatic juice resembles the saliva, and was examined in the last century, with a good deal of care, by De Graaf and Swammerdam. It has often been observed forming stony concretions (S).

The lymph consists chiefly of water, but, like the serous part of the blood, contains a substance which is

coagulable by heat, by acids, and by spirit of wine. Secretion. It is found in the cellular membrane, in the ventricles of the brain, in the pericardium, on the surface of the pleura, in the abdomen, in the bursæ mucosæ, and in the joints under the name of *synovia*, where it has more than an ordinary degree of viscosity and of the lubricating quality. Sometimes, when it stagnates in the sheathes of the tendons and bursæ mucosæ, it acquires a thickness and forms indolent transparent tumors, which become at last gelatinous. It is secreted chiefly by arteries.

176
Fat.

Animal fat is a substance of a nature similar to those oils which are called *fat* in the vegetable kingdom. Its colour is usually white, sometimes yellow, and its taste insipid. Its consistence is various in different animals. In cetaceous animals and fishes it is nearly fluid: in carnivorous animals more fluid than in the fergivorous: in birds, finer, sweeter, and more unctuous, and generally less solid, than in quadrupeds. In the same animal it is more solid near the kidneys and under the skin than in the vicinity of the moveable viscera. As the animal grows old it becomes yellower and more solid; and in most animals is more copious in winter than in summer. In man and some other animals, it is collected in particular follicles of the cellular membrane, accumulated in great quantities in the groin, in the axilla, in the epiploon around the kidneys and around the blood-vessels: it is likewise secreted on the surface of the skin which it protects from acrid substances, and where it sometimes concretes, often from a want of cleanliness, in the form of small worms. In cetaceous animals and fishes it is generally disposed in certain reservoirs, such as the cavity of the cranium and the vertebrae; in some it is chiefly confined to the liver; in serpents, insects, and worms, to the viscera of the lower belly, where it is disposed in small lumps, and only a small quantity found on the muscles and under the skin: in frogs it is collected in certain bags which diverge, as it were, from a common trunk, and seem like appendages to the ovaria and testes. In many places it seems to be secreted by organic pores, and under the surface of the skin by glands. It is accumulated from a diminution of perspiration, from the nature of the aliments, from morbid affection, and from idiosyncrasy. It is of the same nature as the fixed oil of plants; and Lorry has found a striking analogy between it and the bile *.

177
Its kinds in
different
animals.178
Where
found in
different
animals.179
Analogous
to the bile.

* See Fourc

180
Its uses.

It is a bad conductor of heat, and preserves the warmth of those regions where it is situated. It is more adhesive and less apt to evaporate than water, and is therefore a better lubricating fluid. When re-absorbed, it counteracts the saline impregnation if too copious;

(R) The means which he uses is digestion in water; and the process supposes a previous acquaintance with what is common and what peculiar to the fibre and the fat. He maintains that the fibre is entirely composed of carbone, oxygene, hydrogene, and azote. In a high temperature these are decomposed, or at least separated, without producing fat. But when the fibre is kept in water in a low temperature, the carbone unites with the hydrogene of the water, and forms a fat resembling spermaceti, and highly inflammable. Part of the oxygene, too, uniting with azote, forms the nitric acid; and part of the azote uniting with the hydrogene constitutes ammonia; so that three substances are thus formed.

(S) De Graaf was of opinion, that calculi might be formed in all glands. He had seen them above twenty times in the pineal gland, that was long thought the residence of the soul:—He says, too, that they occur more frequently in the pineal gland of Frenchmen than of Dutchmen; and very pleasantly assigns this reason, that the volatile spirit of a Frenchman requires more ballast than that of a Hollander. *De Succo Pancreatico*, cap. 7.

Secretion. copious; and its nutritive power is as three to one when compared to that of the muscular fibre. These properties may partly serve to explain its uses around the several branches of the blood-vessels in those parts which require warmth, and in those which are anywise exposed to motion. They will likewise account for its being more copious in winter than in summer (r); and for its being found in great quantities in the marmot, the dormouse, in the bear, and those animals in general which are constrained to a long abstinence. It forms sometimes steatomatous tumours, and contains the sebæic acid, which acts readily on lead, copper, and iron.

181
Vegetable
fat.

The vegetable fat is contained chiefly in the fruit; and is known by the names of *fat oil*, *sweet oil*, and *oil by expression*. It freezes in different degrees of heat, and varies according to the nature of the plant by which it is afforded.

182
The mucus.

The mucus is more viscid than the lymph, and is not coagulable by fire or alcohol. It is mild, not disposed to corruption, nor soluble in water. This secretion is performed by glands. These glands, in the pulmonary phthisis, secrete often a mucus that resembles pus, and occasions a suspicion of ulcers where there are none. Mucus is found in the nose, through the whole length of the alimentary canal from the mouth to the anus, in the aspera arteria, in the bronchia, in the kidneys, ureters, bladder, and most of all in the urethra. It forms hard stony concretions sometimes in the lungs.

183
Concretions
formed by
it.

184
The seminal
fluid.

The seminal fluid has been seldom the subject of chemical analysis. It is heavier than water, soluble in urine, deliquesces in air and with heat, it hardens with the fixed alkali, and is not coagulable by alcohol. It contains a number of animalcules; and in the system in which it is secreted, it affects the passions, the manners, and the voice, the taste of the muscles, the secretion of fat, and the growth of the hair. In many fishes this fluid is contained in a sort of bags. In most animals it is secreted by glands, which are called *testes*, and is accumulated in the vasa deferentia, or where they exist in the seminal vesicles. Of these vesicles Swammerdam observed long ago, that in the scorpion they were probably "adapted by nature to secrete a seminal matter different from that supplied by the testicles; they are largely (he says) supplied with glandules to answer that purpose, and consist of a considerably thick and spongy substance." Mr Hunter since has endeavoured to show that they secrete a particular fluid in all animals.

185
The nervous
fluid.

So little are we acquainted with the nervous fluid, that some have doubted of its existence. The discovery, however, of Galvani, and the numerous experiments that have since been making on animal electricity, leave us not without all hope that something yet may be known of its properties that will greatly illustrate several phenomena in the animal economy.

186
The milky
fluid.

The lacteal secretion is generally confined to one sex, and is peculiar to the class of mammalia, though something similar may perhaps be secreted in the crops of pigeons.

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It would be impossible here to enumerate or to tell the uses of all the different kinds of secretions in living bodies. We cannot enumerate all that we know without running into tedious detail. The essential oils, the camphor, the gums, the balsams, the resins, and many others, are various secretions of the vegetable kingdom. Each species of plant and animal has generally some peculiar secretion; and this secretion in the individual has often some distinguishing quality, discoverable by taste, by colour, or by smell. These different secretions have likewise each their particular uses. We know the intention of the oily juice with which the bird dresses its feathers, of the glutinous fluid of the fish, of the viscid mucilage of the snail; we see the purpose for which the viper sometimes employs its virulent humour, and for which the scuttlefish ejects its ink: but yet we know only in part.

Secretion.
187
Each species has peculiar secretions.

The difference among the various secretions of the same system seem principally owing to a difference of stimulants, and to some difference in the action, the form and the irritable power of the secretory organ. Passions of the mind very often affect the secretions; and it frequently happens that passion and medicine affect one secretory organ and not another. It is therefore probable that the organs of secretion, and the smallest fibre is an organ of this kind: we say, it is probable that the organs of secretion, like the eye, the ear, and all the different organs of sense, are each affected in some measure by peculiar stimulants; as the stomach by hunger, the fauces by thirst, and the genital organs by venereal orgasmus.

188
Cause of
difference
among the
secretions.

Fermentative mixture, and some original impregnation of the organs, have also been brought to explain the several phenomena of secretion. We conclude with observing, that however much the various fluids of living bodies may differ in appearance, chemical analysis has generally reduced them to a water, a gluten, a saline impregnation, and an oil.

189
To what
reduced by
chemical
analysis.

SECT. VII. Integumentation.

ALL living bodies are furnished with one, two, or with more integuments, which are prepared by secretory organs, and which are a defence against those injuries to which their situation is commonly exposed. Of these integuments, some prevent the dissipation of the fluids, some again resist acrid and corrosive substances, some are indigestible in the stomach, and some are seemingly incorruptible in the earth. By these properties they preserve seeds and the ova of insects for a number of years, waiting the change of soil or of season. They protect both from the action of weak membranous stomachs, and make those animals who choose to swallow them contribute likewise to their propagation. The gelatinous substance ejected by birds, and called the *tremella-nostoc* or *starfall*, we have lately found, by numerous experiments, to be a substance of this kind. It is nothing else than the oviducts of frogs, which, as the embryo in form of an egg moves along their winding canal, are intended by nature to secrete that transparent and viscid glaire which

190
Integumenta-
tion.

191
Some inte-
guments
indigestible
in the sto-
mach, and
resist cor-
ruption in
the earth.

4 U

(r) The efficient cause may be diminished by perspiration.

Integumenta-
tion.192
Some inte-
guments
form a de-
fence by
their hard-
ness;

which constitutes the albuminous part of the ovum, and feeds and protects the embryo in water (u).

Some integuments are chiefly useful by their strength and hardness. The shells of the beetle are an excellent defence for the membranous wings which the creature is seen to pack up in folds when it inclines to creep into the earth. The shell of the snail lodges the intestines (x) when the animal comes forth to search for its food, and it furnishes a safe retreat for the body when any danger is threatened from without. Some animals, confined to their shells, can open and close them by a muscular power; and some shells, like the scales observed on fishes and insects, are disposed into plates, so as to be no hinderance to motion. Several insects which spend a part of their time in the water always compose a shell for themselves where it is needful. The usual materials are sand, straws, or mud, which they cement by a viscid secretion. The shells of most insects are corneous. Swammerdam found that cretaceous shells are composed of layers of indurated membranes, and that they are sometimes covered with a cuticle.

193
By their
hair, down,
or feathers;

Some integuments are covered with feathers, some with hair or a thick down. Besides many other obvious uses of these coverings, they serve in general to repel insects; and being bad conductors of heat, maintain a genial and necessary warmth.

194
By their
prickles;

When the integuments are covered with prickles, they repel attacks by the strength of their points, or by the venom which they infuse, as the stings of nettles and the downs of some insects and plants.

195
By a viscid
secretion;

When they are moistened with a viscid secretion, they preserve the necessary softness of the parts, prevent evaporation, resist acrimony, enable plants to destroy their enemies, and assist the snail in performing its motions.

196
By their ef-
fluvia;

Both plants and animals, but particularly the former, are often protected by an odorous effluvia from their integuments. This effluvia is the finer part of their volatile oil, always inflammable, and so subtil, that the continual emission of it from wood or flowers does not sensibly diminish their weight. To this fragrance it is owing, that the deadly nightshade, the henbane, hounds tongue, and many others, are seen on almost every high road untouched by animals. The mancinelle-tree of the West Indies emits so very dangerous vapours, that the natives poison their arrows with its juices, and those have died who have ventured to sleep under its shade. The lobelia longiflora of America produces a suffocating oppression in the breast of those who respire in its vicinity. The return of a periodical disorder has been attributed to the exhalation of the rhus toxicodendron. Every one knows, says Chaptal, the effects of musk and oriental saffron on certain persons. Ingenhousz mentions a young lady whose death was occasioned by the smell of lilies; and Triller re-

ports an instance of another who died in consequence of the smell of violets. The selection of grasses by different animals seems to be owing to the manner in which the volatile aroma affects their senses. But of all the vegetable exhalations known, those emitted by the bohun-upas, or poison-tree of Java, are the most remarkable. For many miles round no animal can breathe the air, no plant dares to peep from the soil, the fishes die in the poisoned stream, and the birds that venture athwart the atmosphere with despairing shrieks sink down lifeless. Such often is the use of the fragrant oils in the vegetable economy. The shrubs and trees that are covered with thorns are in general a grateful food to animals. They generously avow their manner of attack, and scorn the dark assassination by poisons.

The various colours of the integuments, as well as the aroma, is a species of defence. "Caterpillars which feed on leaves (says Darwin) are generally green; and earth-worms the colour of the earth which they inhabit. Butterflies which frequent flowers are coloured like them. Small birds which frequent hedges have greenish backs like the leaves, and light-coloured bellies like the sky, and are hence less visible to the hawk who passes under them or over them. Those birds which are much amongst flowers, as the goldfinch, are furnished with vivid colours. The lark, partridge, hare, are the colour of dry vegetables or earth on which they rest; and frogs vary their colour with the mud of the streams which they frequent (v), and those which live on trees are green. Fish which are generally suspended in the water, and swallows which are generally suspended in the air, have their backs the colour of the distant ground, and their bellies of the sky." The sphinx-convolvuli, or unicorn-moth, resembles in colour the flower on which it rests; and among plants, the nectary and petals of the ophrys, and of some kinds of the delphinium, resemble both in form and colour the insects which plunder them, and thus sometimes escape from their enemies by having the appearance of being pre-occupied. From colour being thus employed as a defence, many animals vary their colours with the seasons and circumstances; and those which are of different colours in summer according to the places which they inhabit, do all in winter assume in common the colour of the snow.

But a change of colour is not the only change of the integuments. As the outmost are often insensible to stimulants, and for obvious reasons possess little of the vital principle, in all cases where they cannot be enlarged to admit an additional increase of growth, where they are not furnished with necessary organs to repair those injuries which they may suffer from disease or accident, the body is endowed by nature with a power to throw them off, and to produce others in their stead (z). For this reason we see the tree casting annually its exterior bark, the lobster his shell, the bird

198
By their
change of
colour.199
Are chan-
ged them-
selves.

(u) We have often inflated the oviducts of frogs, and dried them; and afterwards putting small pieces of them into water, have seen them swollen in a few hours to a large size, and forming the tremella-nostoc or starfall.

(x) This snail is found in our gardens, and carries its shell, including the intestines, upon its back.

(y) The same is the case with many fishes that live in lakes.

(z) Several small animals in changing their integuments change likewise the interior coat of the alimentary canal, which they void with the faeces.

Irritability. bird his feathers, the quadruped his hair, and sometimes his horns, the serpent his skin, and man himself renewing the scales of the epidermis. These changes usually take place once a-year, twice frequently with respect to serpents, and oftener in toads, who have been observed to devour the skin which they throw off. All the integuments of ova and seeds, being wholly the production of parental organs, neither are nor can be repaired.

200
Toads eat the skin.

SECT. VIII. *Irritability,*

201 **Irritability.** Is that property of the living fibre by which it acts in consequence of stimulants. Being one of the great causes of motion in living bodies, no property has excited more wonder, been the cause of more error, or exhibits such a number of striking phenomena to the senses. These effects, however, have arisen rather from the nature of the stimulants than from any thing mysterious in irritability. Many of the stimulants by which this property in bodies is displayed are often invisible, unknown, or unthought of; and men being conscious that a number of their motions proceed from a stimulant, that is, under the direction of a mental power, they readily conclude from a sort of analogy, that every motion in plant and insect that seems to answer a useful purpose, and is caused by some invisible stimulant, is the consequence of mind directing from within. They further suppose that irritability is in all cases the consequence of nerves, which are those organs which nature has employed in the animal kingdom to convey stimuli between body and mind. These singular conclusions have led to others that are less admissible even than themselves. It has been imagined that creatures the most stupid possess within them a principle of mind that is incapable of further improvement, but which notwithstanding is in many respects superior to reason, and a surer guide in whatever relates to self-preservation or that of the species: it enables the animal to predict without foresight, and to act rationally without intelligence. This wondrous principle has been called instinct: and in order to account for some of the singular phenomena of vegetables,

202
The phenomena of irritability have led to strange conclusions.

203
Some of these conclusions.

a share of it has graciously been allowed to plants; which having become favourites of late, have been also presented with the privilege of sensation, permitted to fall in love, and to marry, and on some occasions to exercise the faculty of volition.

At these concessions the metaphysician will naturally smile. He knows how many impose on themselves by the mere sound of their own words, as if by calling the snow black they were to discover a new property; which curious discovery would turn out at last to be only a gross ignorance of language, and the foolish misapplication of a syllable. He who has studied the philosophy of mind, and been accustomed to view objects through another medium than the magic colourings of passion and of fancy, readily perceives a something of absurdity in ascribing such wisdom to plants and insects. With respect to animals, these gentlemen do not recollect that voluntary actions are of two kinds, as they proceed from design or propensity; that in performing one of these kinds the mind itself has an object in view, and is properly the source whence they originate; but that in the other the mind is merely a secondary agent, is acting under the influence of stimuli, is often not aware of the consequences, or although aware is often so insatuated as not to regard them, however fatal. It is generally well known to the naturalist, that not a few of these propensities arise from the form and structure of the body, from the manner in which the optic nerve is affected by colours, the olfactory by smells, the gustatory by tastes, and the auditory by sounds; from the different ways in which the fauces are affected by thirst, the stomach by hunger, and the genital parts by venereal orgasmus.

204
Voluntary actions of two kinds, from design and propensity.

205
Whence propensities arise.

206
They act as stimulants through the medium of nerves.

Besides these and other propensities which operate as stimulants in the system itself, the naturalist has found that light, heat, and moisture, in various degrees, from absolute darkness, coldness, and dryness, act as stimulants upon living bodies: he has experienced that electricity is a general agent, that several plants emit flashes (A), and that some animals even give shocks resembling the electric. He has made it probable that

4 U 2

it

(A) "In Sweden (says the author of the *Loves of the Plants*) a very curious phenomenon has been observed on certain flowers by M. Haggeren, lecturer on natural philosophy. One evening he perceived a faint flash of light dart from a marigold: surprised at such an uncommon appearance, he resolved to examine it with attention; and to be assured that it was no deception of the eye, he placed a man near him with orders to make a signal at the moment when he observed the light. They both saw it constantly at the same moment; the light was most brilliant on marigolds of an orange or flame colour, but scarcely visible on pale ones; the flash was frequently seen on the same flower two or three times in quick succession, but more commonly at intervals of several minutes; and when several flowers in the same place emitted their light together, it could be observed at a considerable distance. This phenomenon was remarked in the months of July and August at sunset, and for half an hour after when the atmosphere was clear, but after a rainy day or when the atmosphere was loaded with vapours nothing of it was seen. The following flowers emitted flashes more or less vivid in this order: The marigold, garden nasturtion, orange lily, African marigold; sometimes it was also observed on the sun-flowers; but bright, yellow, or flame colour, seemed in general necessary for the production of this light, for it was never seen on the flowers of any other colour. The flowers were carefully examined with a microscope without any insects or phosphoric worms being found. M. Haggeren, after having observed the flash from the orange-lily, the anthers of which are a considerable space distant from the petals, found that the light proceeded from the petals only; whence he concludes, that this electric light is caused by the pollen which, in flying off, is scattered upon the petals (*Observ. Physique par M. Rozier*, vol. xxxiii. p. 111.)"—Addition to the note on *Tropeolum*, the *Loves of the Plants*. The author of this beautiful poem supposes, that the time of the twilight is sometimes extended by different bodies emitting the light which they had absorbed during the day.

Irritability.

207
Irritable
principle
affected by
various sti-
mulants.

208
Singular
motions in
plants.

it produces all the wonders of crystallization; and that the cause of chemical affinity, and of all the phenomena displayed by the magnet, is at least akin to it. In the male parts of plant and animal, he has seen both the fluid and the pollen that give the stimulus in generation, and are accompanied with so extraordinary changes in the system. He has found that much of the vegetable economy, and that even the function of generation itself, as the developement of the fecundating powder, and its application to the female organ, is partly carried on by wind, heat, and other such agents. He has reason to conjecture that many general agents in nature are yet unknown. By the help of chemistry, he has found out lately a considerable number which are called gases, which are of the very highest importance in both the animal and vegetable economy, and which, like the aromas of plants, or the causes of contagion, produce their effects without being visible. It is only, too, of a late date that the celebrated professor Galvani of Bologna has excited so much curiosity through Europe, by the discovery of a certain stimulus that resides in the nerves, that passes along electric conductors, and which by a certain application of metals occasions a vivid flash in the eye, convulses the body of a living frog, and rouses the detached limbs into action. The change of colour in the integuments according to different seasons and circumstances, though it answer a rational and useful purpose, proceeds from a cause that does not seem to be very well known. Even many agents which are not invisible, nor yet unknown, exert their influence in a secret manner, so as not to be obvious to the senses. It is generally known that many singular movements of plants are owing to heat, many to light, and several to moisture. The barley-corn is often observed to creep on the ground by means of its awn, which dilates and contracts according to the different degrees of moisture. The wild oat, employed as an hygrometer, moves through the barn, travels through the fields, nor ceases to be changing its situation till its beard fall off, or till it meet with a soil where it conveniently may strike root. Upon a similar principle of motion, the ingenious Edgeworth constructed an automaton which moved through a room which it inhabited. It is easily conceived how these singular effects, arising from causes that are unknown, invisible, or unthought of, should give birth to the notions of witchcraft and of instinct, and impress the fancy with an idea of something resembling sensation and volition in the vegetable kingdom. These agents, whether invisible, unknown, or unthought of, directed by regular and uniform laws under the great Author of nature, produce effects that indicate pre-science, wisdom, and design, and causing a transient or permanent propensity in the mental part, frequently controul by resistless sway the finite minds

that reside in matter. These minds, in a living body, have generally been found accompanied with some system of nerves; and these nerves happening with equal facility and promptness to convey stimuli from the mind to the body and the body to the mind, the great difficulty has been to determine with respect to others when the action proceeds solely from design, solely from propensity, or from design and propensity together. The uniform conduct of the brute creation would seem to imply that their mind has little of inventive power; that it generally acts from the impulse of propensity; and that its manners are varied, not in consequence of a change of sentiments, but from the induction of new habits, and the application of new stimulants.

It has been observed, that in all animals the vigour of mind has some relation to the quantity of brain, and to the perfection of its organization; and that the acuteness of the different senses is generally proportioned to the quantity of nerve bestowed on their organs. Man has a greater proportion of brain than any other animal; but many an animal has a much greater proportion of nerve bestowed on different organs of sense. Many animals have therefore acuter senses than man; but man has a greater vigour of mind than any other animal on this globe.

The brain of quadrupeds is somewhat similar to that of man, but proportionally smaller, and not perhaps so well organized. Willis has observed, that among animals the structure of the cerebrum is more variable than that of the cerebellum; that the former generally furnishes nerves to the voluntary muscles, and the latter with the medulla oblongata to the involuntary. He has likewise remarked, that the round prominences commonly called the nates and testes are large in the quadrupeds, which are active and vigorous, and in some measure able to procure their own subsistence at birth; that the tuber annulare is large in the quadrupeds that are distinguished for their sagacity; that wherever the tuber annulare is small, the prominences are large, and wherever it is large the prominences are small. From these observations he has concluded that the tuber annulare is the seat of genius, and the round prominences the seat of what has been called instinct (c).

The brain of birds is seemingly the reverse of the human brain; the cortical substance is the interior, and the ventricles are situated in the white part on the outside. In the brain of the bird there are no circumvolutions like the intestines, no fœnix, corpus callosum, nor corpora striata.

The brain of fishes is in many respects similar in its structure to the brain of birds. It is very small in proportion to their body, and is generally surrounded with an oily matter. In one genus of fishes, the gadus, Dr Monro found spheroidal bodies between the dura

(B) The acuteness of the senses depends upon the readiness with which their organs are affected by stimuli. This readiness depends on irritability. It is not necessarily connected with mind, nor should it ever be confounded with perception, which in classical language signifies a property of the mental principle.

(c) Few perhaps who have dissected different animals, and who, besides a number of structures, have seen a variety of tubercles and lobes existing in the brain, will be rash in ascribing to any one of them one particular office. The pineal gland was for some time thought the seat of the soul. It was afterwards found to be of-

Irritability. dura and pia mater, and covering the greater part of the nerves like a coat of mail. The two senses, seeing and hearing, in many fishes are often acute. By laying one ear on the water, and striking the surface at some distance, this element is found to be a better conductor of sound than even the air.

²¹⁴
Of reptiles. The reptile tribes have very little brain, and like the fishes have no ganglions upon their nerves.

²¹⁵
Of insects. Most insects have no brain at all, but a nervous cord that is full of ganglions, that runs from one extremity to the other, and is denominated the spinal marrow. This knotty cord, however, is not marrow; the insect has nothing resembling a spine; and the situation of the cord in the animal is often not along the back but the breast. In the silk-worm, and most other insects, this cord is in contact with the alimentary canal; and the first ganglion, which is sometimes called the brain, though not in the head, divides, in order to give a passage to the stomach, and again unites in a second ganglion. Swammerdam found in a species of snail a brain with two lobes, in contact with the stomach, moveable by muscles, and without a fixed place in the body.

²¹⁶
A moveable brain in a species of snail.

²¹⁷
Polypes. The polypes exhibit no appearance of brain or of nerve, as in other animals. Their skin, however, is observed to be full of a number of small granular bodies, which are connected by a glaucous matter that resembles a thread. Like rows of bead-strings, they extend from one extremity to the other, and along the arms. Trembley learned from a number of experiments that they received their colour from the food, and therefore supposed them to be vesicles or glands. If not like the tuberos nerves of the insects, they at least are not very different in appearance from the nerves of the

gadus that are covered with a number of spheroidal bodies like a coat of mail.

Some things would insinuate that a nervous system does not seem to be necessarily connected with mind. The stimuli of nerves may be brought into action by other causes besides mind. Even many nerves are not subjected to the influence of mind; and the mind often by its own inattention may lose the power which it originally possessed over nerves. Many persons can move the muscles of the ear, and others may have lost that power through neglect. After Fontana had observed that the heart was a voluntary muscle in a wheel polype, he learned to retard and accelerate the motions of his own at pleasure. If some nerves, from a sort of prescription, thus cease to be obedient to the power of mind, others by frequent service and habit become so obedient as to convey their stimuli to the muscles almost without the consciousness of mind. The motions excited by the stimuli of nerves are in many cases exceedingly rapid. These may be seen in the wings of most insects, but are most noticed in dancers, tumblers, and apes, and all those animals that are exhibited for feats of agility.

²¹⁸
Nerves act under other agents besides mind.

²¹⁹
The great influence of the stimuli of nerves have often been so vigorous and prompt, as to have torn the muscle from the bone, and to have broken the bone itself. They often affect the organs of secretion, have often unhinged the fabric of the system, occasioned death, and accounted for the miracles that have been ascribed to the power of fancy. The prompt motions of what have been named sensitive plants seem owing to a different species of stimulants acting on extremely irritable fibres (D).

In the animal kingdom all muscles in the time of action

ten filled with stony concretions; and the celebrated Nuck, instead of assigning to it any prerogative, contented himself with writing its epitaph.

VIATOR

Gradum. Siste.

Omni que Conatu. CONARIUM.

Respice. Sepultum.

Partem. Tui. Corporis. Primam.

Ut. Olim. Volebant.

Animæ. Sedem.

GLANDULAM. PINEALEM.

Hoc. Seculo. Natam. Et. Extinctam.

Cujus. Majestatem. Splendoremque.

Fama. Firmarat.

Opinio. Conservarat.

Tamdiu. Vixit.

Donec. Divinæ. Particulæ. Aura.

Avolaverat. Tota.

LYMPHAQUE. Limpida.

Locum. Suppleret.

Abi. Sine. GLANDE. Viator.

Lymphamque. Ut. Aliis. CONARIO. Concede.

Ne tuam Posteris

Mirentur Ignorantiam.

(D) In many instances the prompt motions of animals seem more owing to the irritability of their fibres than to what has been called the sensibility of their nerves. The poet was mistaken when he supposed that the mangled insect would feel as sensibly as a mangled giant. When the gad-fly fixes fairly on the hand, you may cut off its wings, its legs, its antennæ, and a part of the lower division of its body, without disturbing its gratification, or apparently occasioning to it much trouble.

²¹⁰ Irritability. action are observed to discharge a quantity of their blood; and those muscles which are naturally white are the most irritable. In all living bodies, the irritable power will cease to obey the action of a stimulant if either long or violently applied. After exercise, therefore, the irritable fibre requires rest, after heat cold, after waking sleep, before it again becomes submissive to the action of the stimulant that overwhelmed it.

²²¹ Effects of a stimulus when long continued. This is the reason that in plants and animals there are certain exertions and functions of the system that can only be continued at intervals and seasons. The natural stimuli of involuntary muscles continue to act, and the muscles continue to obey through life.

²²² Organs of sense intended to give distinct impressions. The organs of sense were formed to mark the difference of stimulants; yet living bodies are affected by light without having eyes, by sounds without having ears, by odorous effluvia without having smell, and by sapid bodies without having taste. It is easily conceived how these objects, by their inherent properties or motion, may produce a confused sort of excitement in every highly irritable fibre. But the organs of sense are peculiarly fitted to receive accurate and distinct impressions from each of these objects; and these different impressions seem not to arise from any difference in the kind of nerves by which they are received. All the difference that has been observed arises from the structure of the organ itself, and from the manner in which the nerve is distributed through it. Other parts of the animal body, as the stomach, the fauces, and genital organs, are thus affected by particular stimulants; and many animals, and even vegetables, may be affected in various manners, and by various stimulants, of which neither our feelings nor our senses can give intimation of any thing analogous.

²²⁴ The organs of sense. With respect to the several organs of sense, some animals have many eyes without any motion, and some animals have few eyes with varieties of motion. The entrance to the ear in some animals is from the mouth, as happens in the frog; and the bones of the ear are without the cranium, as in some fishes. The sense of smelling is found in the nose: this sense is astonishing in dogs; and even sheep, in distinguishing their lambs, trust to it more than to seeing or hearing. The sense of taste is far from being general; and the sense of touch can hardly be said to reside peculiarly in any one organ.

SECT. IX. Motion.

²²⁵ Motion.

²²⁶ Locomotion

IRRITABILITY is one of the great sources of motion in all living bodies; and this power is brought into action immediately by nerves or some other stimulants. Locomotion here is principally considered; for altho' the kinds of internal motion employed in secretion and the other functions be as remarkable, in the eye of the philosopher they have not so generally attracted the attention. Most animals are capable by nature of changing the place which their body occupies; for this reason the irritable fibres being formed into bundles, which are called *muscles*, are in most animals attached to bones, cartilages, or hard integuments, which they move as levers: these levers, with their muscles attached, are in most cases formed into wings, fins, and legs of various kinds, and are employed in performing

the motions of flying, swimming, walking, leaping, and creeping. So very necessary, in the opinion of some of the ancients, was one or other of these instruments to progressive motion, that the movement of the serpent was often ascribed to a preternatural cause, was supposed to resemble the *incessus deorum*, and procured to the animal one of the highest and most honourable ranks among the emblematic kinds of divinities. Even Moses himself, who was unwilling to allow it the character of an agathodæmon or good genius, was yet so puzzled at its being able to move without feet, that he pronounces it a tool of the devil; and says that it was deprived of its feet by a curse from heaven for seducing mankind into idolatry. Notwithstanding, however, the surprise that has been occasioned by its singular movement, the motion of snails, though not so rapid, is in many respects as extraordinary: they adhere by a certain viscid secretion, on dry ground this secretion forms a pavement over which they glide; and they proceed by the action of muscles without bone, cartilage, or shell, to which these muscles can be attached.

No animal walks without legs or flies without wings (z); but there are many that swim without fins, and that leap and creep without any legs. The rapidity of movement is not proportioned to the number of instruments that are employed: if the spout-fish be observed to move slowly with one leg, the sea-urchin moves still slower with many thousands; the oyster moves by squirting out water; the scallop by the jerk of its shell, and when in the water it rises to the surface and sails before the wind.

Many animals are formed by nature to fly, walk, leap, and swim; the fate of those is rather uncommon whose muscles or feet are by nature attached to their integuments; the lobster is obliged to throw off its shell, and the caterpillar all its feet with the skin, and in that situation to remain stationary till it receive new instruments of motion.

Whoever has read the celebrated work *De Motu Animalium*, needs not to be told that, besides the organs which are here mentioned, the form, the structure, and even the specific gravity of the body, as depending on the nature of the bones and muscles, or as varied by air, vesicles, and bubbles, with a great variety of other circumstances, are necessary to explain the different phenomena of locomotion.

As to vegetable motions, they evidently depend on external agents: The motion of the wild oat has been mentioned; the wings of seeds only fit them to be carried by the wind, their specific gravity to float in the water, and their legs or tentacula to adhere to bodies that are in motion; the singular motions which have been ascribed to sleeping, to waking, to sensation, and volition, in the vegetable kingdom, seem only the consequence of light, heat, moisture, and such stimulants, acting invisibly or with secret influence; the opening and closing of the meteoric flowers are always correspondent to the states of the atmosphere; and the opening and closing of the equinoctial and tropic flowers, to the light, the length, or shortness of the day.

The

(z) The fins of the flying fish enable it rather to spring than fly.

Habit. The principal intentions of locomotion are to get food, to shun danger, to promote intercourse, and disperse the species.

234
Intention
of locomotion.

SECT. X. *Habit.*

Habit; HABIT here deviates a little from its usual meaning. We employ it to signify that principle in living bodies by which they accommodate themselves to circumstances, assume as it were a different nature, and in many respects undergo a species of transformation.

236
Its effects
on vegeta-
bles; So very much do some individuals of the vegetable tribe accommodate themselves to different situations, to soil, to climate, and the state of cultivation, that those naturalists who have not been accustomed to nice and accurate discriminations, have frequently mistaken the variations of the same plant for so many species. These variations may be daily seen by examining the plant as it grows on the mountains, in the valleys, in the garden, or in the fields; or by bringing it from a rude uncultivated state, when it sometimes lays aside its formidable prickles, and changes the colour and structure of its flowers.

237
On the con-
stitution
and integu-
ments; In the plant and animal, the delicacy and vigour of the constitution are oftener the effects of habit and circumstance than original conformation. We have mentioned already the varying colour of the integuments, and the purpose which it serves in changing with the seasons. We may here add, that animals covered with a down or hair have it thick or thin, long or short, according to the different exigencies of climate.

238
On man-
ners and
propensi-
ties; Those changes produced on their body are accompanied with others which are the causes of new tastes, of new propensities, and new manners. At the Cape of Good Hope the ostrich inclines to sit on her eggs day and night like any other bird; but in Senegal, where the heat is great, she is somehow disposed to leave them to the sun during the day. In those countries where provisions can be found during the greatest part of the year, the bee gradually loses the propensity of laying up stores for the season of winter; and in "those countries infested with monkeys, many birds (says an amusing and instructive writer) which in other climates build in bushes and the clefts of trees, suspend their nests upon slender twigs, and by this ingenious device elude the rapacity of their enemies." Man, from imitation, is exposed to a great number of habits peculiar to himself; and physical causes have ingeniously been assigned for the variety of his features and complexion.

239
On man.
240
The extent
of its effects
unknown. Few experiments have yet been instituted with a view to show how far this accommodating principle in

nature may be extended in the different species of plants and animals. It is known, however, that the lamb and the dove can be made carnivorous; and that the hawk, laying aside his ferocity, can be brought by art to live upon grain.

Of all the effects of this singular principle, the most wonderful are those which are seen to take place with respect to generation. The fact is far from being new to the naturalist, that certain animals, oviparous at one season, are viviparous at another. This indicated much of accommodating power, though far inferior to what has been since witnessed and displayed: for who from all this could suspect, that any animal which usually propagates by an intercourse of sexes, could in any circumstance accommodate so far as to multiply its species another way. Bonnet of Geneva, however, has discovered, that the puceron or vine fretter, which generally propagates by an intercourse of sexes, is not only oviparous at one period and viviparous at another, but in all cases where the union of the sexes is not to be obtained, can easily accomplish all the purposes of generation without it. Similar experiments have likewise proved, that many plants can bring to maturity a productive seed, though the male parts of the flower be destroyed before they can in the usual way have any impregnating effect on the female. In this case the conclusions drawn have been somewhat new. From these experiments it has been inferred, that the sexual system is ill-founded, and that most of the learned naturalists of Europe are on this subject labouring at present under a mistake. This reasoning, however, is not satisfactory: for why, it might be asked, in the vegetable kingdom more than in the animal, should the mode of generation be necessarily uniform? Tho' some plants may, like some animals, propagate without sexual distinctions, the conclusion is not logical that these distinctions are useless in all; and though some few may, in particular instances, propagate without that impregnation to which they were accustomed, will any one demonstrate, that accommodating nature does not here as in the puceron adopt a new method to accomplish her designs?

In all living bodies, it frequently happens that several characteristic distinctions, as the colour, the features, and a number of diseases that are originally the effects of circumstance, do at last become so fixed in the system, that they are afterwards transmitted to posterity through some generations (F). With regard to animals these facts are well known; and as to vegetables, it has been observed by a pupil of Linnæus, that the apple-trees which are sent from Britain to New England blossom at first too early for the climate, and

Habit.

241
How far it
accommo-
dates with
respect to
generation.

242
Its effects
lasting and
sometimes
propagated.

(F) Might not these facts reasonably claim the attention of those who mean to form matrimonial connections? How many might easily entail on their posterity hale constitutions, regular features, beautiful forms, sound minds, and tempers at once uniform and cheerful, who yet, from their sordid desire of wealth or their fond admiration of high rank, bequeath to them only scorbutic habits, deformed persons, disagreeable features, mean understandings, and forbidding tempers. Excepting the more extraordinary properties of body and mind, there are few that may not in some measure be transmitted to posterity: but nature seems unwilling that what is very eminent should ever be extended to a genus or a species; and therefore the sons of Cicero and Cromwell are only two of a thousand instances that might serve to prove, that neither extensive nor eccentric geniuses can be made hereditary: In the second generation they often degenerate into minds that are weak, fatuous, or deranged; or into minds that are chiefly remarkable by their oddities and whims.

²⁴³ **Habit.** and bear no fruit; and that it is only after some years that they conform to their situation: and this circumstance, by the way, explains why roots and seeds germinate sooner when brought from southern than when they are brought from northern latitudes. The very permanency of these effects has often been the cause of much confusion and error in philosophy: for the naturalist, mistaking the lasting though temporary qualities of habit for the real and essential qualities of species, has not unfrequently drawn conclusions from his experiments that have been contradicted by similar experiments in other circumstances. This is one of the obvious reasons why experiments exhibit so many inconsistencies and contradictions, and why we are amused with such a multitude of visionary theories about the properties of living bodies.

²⁴⁴ **And medical prescriptions often dangerous.** From not attending to the numerous circumstances that induce habits, and to that general accommodating principle in living bodies, many medical prescriptions are found to be not only useless but mischievous; and many parents, by studying the health and comfort of their children, bring on habits that prove the sources of perpetual sickness or the certain presages of an early death.

²⁴⁵ **Its origin;** The accommodating principle is one of the consequences of irritability. Its various effects arise from the actions of different stimulants on the irritable fibre; and the after-duration of these effects, from the modifications of the irritable fibre, become habitual from the frequently repeated action of the stimulants.

²⁴⁶ **Its design.** The design of this accommodating principle is to fit both the plant and the animal for a more extensive and a more varied range of existence.

SECT. XI. Transformation.

²⁴⁷ **Transformation** MORE remarkably striking than any of those changes to which the plant and animal are exposed, from the variations of habit or the change of integuments, are those alterations which they undergo from metamorphosis or transformation. It has indeed been asserted, that these alterations consist in throwing off certain temporary coverings or envelopes: but there is here a want of precision in the ideas, and consequently a want of accuracy in the expression. The same persons who make this assertion inform us, that caterpillars change their skin, and many of them even several times, previous to the period of their transformation. Transformation, therefore, and a change of

²⁴⁸ **Not merely a change of temporary envelopes.** integuments, by their own concessions, are different things. The truth is, transformation frequently takes place independent of any change of integuments; and there is often a change of the integuments without transformation or any appearance of a new form: but a new form or change of appearance is always implied in metamorphosis or transformation. This new form is sometimes occasioned by a change of shape, consistency, and colour; as when the lobes of a seed are converted into seminal leaves. It is sometimes occasioned

²⁴⁹ **In what it consists, and different kinds of it.** by a change of proportions among the parts: the proportions of a foetus, every one sees, are different from those of a full grown man; and the painter, merely by observing the proportions, represents a child, a dwarf, and a giant, on the same scale. It is sometimes occasioned by the addition of new organs; as when the emmet receives wings, and the plume of the

seed is fed by new roots striking into the ground; or it is occasioned by a change of both the form and the organs, and their mode of operation, as happens remarkably in some insects: for though all living bodies, plants and animals without exception, undergo partial or general transformations, yet these changes are chiefly observable among insects. Many insects appear to consist of two distinct animal bodies one within the other: the exterior, a creature of an ugly form, residing in the water or under the earth, breathing by gills or sometimes by tracheæ projecting from the tail, possessing a voracious and groveling appetite, and having a system of sanguiferous vessels that circulates the blood towards the head. When all its parts decay and fall off, the creature inclosed succeeds in its stead: this often is an animal of a different form, generally lives in a different element, feeds on a different species of food, has different instruments of motion, different organs of sense, different organs of respiration, and differently situated; and being endowed with the parts of generation, inclines to gratify the sexual propensity, and produces an embryo which becomes like the first, and from which afterwards in process of time a creature is evolved similar to itself.

If the embryo or egg be deposited on a leaf, the leaf frequently is observed to bend, to wrap it in folds intended for the purpose, and to protect it from injuries and danger. If deposited in the body of an animal or plant, they accommodate themselves to its wants and necessities, and furnish a tumour which serves it for a nidus, and besides, like an uterus, supplies it with nourishment; and if deposited in the body of an insect, the creature provides for the future destination of its young charge with all the tender care of a parent, and then dies.

These circumstances, added to the great variety of forms which insects assume, render it sometimes difficult to know who is the parent. We cannot, for instance, pronounce with certainty who is the true parent of the gordius, known by the name of the *feta equina*, or hair eel. A set of experiments, which we once began with a view to throw some light on the subject, were interrupted unfortunately by an accident, and we have not since had leisure to resume them. We learned only, from a number of observations, that certain black beetles about the end of the summer months have the strongest propensity to run into the water, where they soon die; and that one or two, and sometimes three or more, of those eels gradually drop from the beetle by the anus. Whether other insects provide for the gordius in this manner we have not yet been able to determine.

The transmutations of some animals are most observable in the uterus and egg. Some early transformations of the chick may be seen in the plate belonging to this article; and anatomy has often witnessed the change which happens at birth with respect to circulation, respiration, digestion, and the other functions.

If the reader wish to be much acquainted with the manners and transformations of insects, he will derive information and pleasure from consulting the plates and memoirs of Reaumur. If he wish to know their intimate structure, the laborious Swammerdam can introduce him to a new and amusing species of anatomy. This last author had before Reaumur defined and described

Transfor-
mation. 254
Similar
transforma-
tion in
plants and
animals. 255
Transfor-
mation ac-
companied
with new
propensi-
ties, &c. 256
Is an evolu-
tion of parts
by nutri-
tion. 257
The design
of transfor-
mation.

scribed the kinds of transmutations among insects and some other animals. He has shown similar transmutations in plants; and in plate 46 of his Book of Nature, has compared the frog and the clove July-flower under their six different forms.

In all living bodies possessed of mind, the changes of form, as well as the change of habit and of age, are usually accompanied with new propensities, appetites, and passions. It may therefore be inferred, that we ought not to look for the cause of temper in either the brain or the nervous system; or to imagine, that the propensities, appetites, and passions, are properties of mind: they seem only affections happening to mind in consequence of stimuli and organic structure.

Microscopic observations having demonstrated, that all the forms of the plant and animal existed previously in the seed or embryo, transformation must be owing entirely to the evolution of the different parts by means of nutrition.

What nature intends by transformation, we pretend not to say; but by means of transformation different elements are peopled, the different seasons variously adorned, and animated nature wonderfully diversified without a multiplication of beings.

SECT. XII. Generation.

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Generation. MANY of the causes which contribute to the formation of a living body have hitherto eluded human research; may in all probability never be discovered; and perhaps are beyond human comprehension. Some

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One hypo-
thesis, that
all living
bodies were
formed at
once, and
brought in-
to view by
generation. 260
Objections
to this hy-
pothesis. 261
Does not
explain the
renewal of
parts,

philosophers, considering the extreme divisibility of matter, and learning from the microscope that transformation is but the development of certain parts that previously existed, have thence imagined that generation is somewhat analogous; that all regularly organised bodies received their form at the beginning; that the first of every genus and species contained by involution the numerous millions of succeeding generations; and that the union of the two sexes gives only a stimulus, and brings into view forms that had existed since the world began.

This hypothesis has attempted to explain a thing that is unknown by what must for ever remain incomprehensible to the human mind in its present state. It appeals absurdly from observation to conjecture; and supposes that bodies which are originally brought into view, which are daily augmented, frequently repaired, and sometimes renewed by organic action, do nevertheless in their first formation require an effort superior to what omnipotent power is able to perform by secondary agents.

Had the supporters of this hypothesis considered that many herbaceous plants produce new flowers when the first set are untimely cut off, that lobsters and many a species of insect renew their limbs, and that certain polypes can raise so perfect vegetable forms as to puzzle the naturalist whether or not he should class them under plants; they would not surely have prescribed such bounds to omniscient wisdom and almighty power, or declared with such confidence what the Author of Nature, to speak with the vulgar, must necessarily perform by his own hands, or what he may intrust to secondary causes regulated by his laws.

These philosophers will find it difficult to account in a very satisfactory manner for monstrous pro-

ductions, and for those changes of structure and of form which for a while continue hereditary from the influence of habit. They object to others, that all the parts of a living body are mutually dependent on one another, and that they must necessarily have been coeval or existed at once. But though every attempt that has yet been made to ascertain which of the vital organs are prior and which posterior in a living body has proved unsuccessful, it has not been demonstrated that either themselves or their functions are coeval. It may, on the contrary, be plainly demonstrated from observation, that the lungs and the stomach do not begin to perform their functions so early as the heart and the vascular system; that the heart and its system perform their functions, even with some considerable changes, immediately after birth; that the vegetable tribes are without nerves; and that brain and nerves in the animal kingdom perform more and more of their functions as the system approaches towards maturity. It has even been shown that bones will unite, and the limbs of an animal continue to be nourished without nerves; that there is a principle of life in the blood; that the heart will act under other stimuli besides that of nerves; and that sound logic does by no means require us to suppose that the first actions of the foetal heart, or the punctum saliens, are owing to the influence of stimuli from the brain, or that the brain must have existed when the heart first moved.

254
Although the minuteness and transparency of the parts may prevent us from seeing the first gradual formation of the embryo, yet every observation corroborates the opinion that it is formed by secondary causes, and through the medium of organic powers.

265
It has been asked, whether or not is the embryo formed by the joint operation of the two sexes? or is it formed entirely by the one, and brought into action by a stimulus from the other? The former of these questions supposes that each of the sexes has a seminal fluid; that some mixture takes place in the uterus, and produces an embryo, in the same manner that a neutral salt assumes a certain and determinate form. The notion implies some general and confused idea of chemical combination; but does not bespeak a very clear head, profound reflection, or much acquaintance with the nature and properties of living bodies.

266
For a long time past the most rational physiologists have generally agreed that the embryo is formed gradually and slowly in one or other of the two sexes, not by chemical combination and mixture, but a system of organs, directed by laws and prompted by stimuli, with many of which we are yet unacquainted. From the great Hippocrates downwards to Aquapendens and Harvey, the credit of furnishing the foetal embryo was almost universally given to the females of those animals which are named oviparous. Among the viviparous, appearances were such, that the female was left to contest it with the male. At last the eclat of Leeuwenhoek's discoveries seemed to put an end to all doubts entertained upon the subject. He very plainly saw through his microscope that very great profusion of particles that move to and fro with amazing rapidity in the male semen. Upon this he embraced the doctrine of Hamme, who had seen them before, and supposed from their motions that these particles were not only animalcules, but the principles or rudiments

Genera-
tion. 262
Nor the
production
of mon-
strous
forms. 263
Proceeds on
question-
able data.

254
Embryo
formed by
secondary
causes.

265
By one of
the sexes
or both.

266
The opi-
nion of
Hippo-
crates, Her-
vey, and
their fol-
lowers.

267
Of Hamme,
Leeuwen-
hoek, and
their fol-
lowers.

Genera-
tion.

268

Objections
to this last
opinion.* Vid.
Harv. de
Partu.

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The former
opinion bet-
ter support-
ed.

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More gene-
rally adopt-
ed.

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Difference
between
oviparous
and vivipa-
rous ani-
mals and
plants.

rudiments of that animal in whom they were formed, and that they were deposited in the uterus of the female only to be nourished and augmented in size.

What raised suspicions against this theory were the numerous animalcules discoverable by the microscope in other fluids, and that vast profusion of young embryos in those cases where never more than one or two arrive at maturity. It was an objection to it, that some females had been impregnated where the hymen remained unbroken, and where the vulva had been shut so closely as to leave only a passage for the urine. The male semen in these instances could have reached only the mouth of the uterus. It was another*, that in all birds which have no intrant penis the male semen is never sent farther than the mouth of the vulva, and that a single act of the male impregnates the whole eggs of the ovarium. A third objection is the pollen of flowers, which is not applied immediately to the seed, but often to a distant part of the vessel in which it is contained. A fourth may be taken from frogs and fishes, and all those animals whose eggs are impregnated after emission. And, lastly, Haller had observed the pullet completely formed in those eggs that were not fecundated.

Supposing animalcules in every kind of prolific semen, yet it frequently happens that this semen undergoes a change before it can be applied to the embryo. The semen of the frog is dissolved in water; and that which is injected disappearing suddenly after coition, would seem to intimate, that in those animals which have been examined it had met with a solvent somewhere in the uterus, and produced its effect after the change. It is now, we believe, pretty generally known, that the embryo does not commence its existence in the cavity of the uterus. De Graaf observed it on its passage down the Fallopian tube; he saw the place where it first began in the testicle of the female; and cases have occurred where it has missed the Fallopian tube, where it has fallen into the abdomen, where the placenta has been formed, and the foetus has grown among the viscera of the lower belly.

From these facts it has been concluded, notwithstanding some feeble objections, that the female testicles are real ovaries containing eggs; that these eggs are brought into action by the stimulating power of the male semen, which is sometimes thrown into the cavity of the uterus, sometimes applied only to its mouth, and sometimes sprinkled over the egg after emission.

The principal difference, therefore, that occurs between oviparous and viviparous animals, considered as such, appears to be this: the former are accustomed to eject their embryo before it escapes from the membranes of the egg; the latter retain it long in the uterus until it acquires a considerable size, until the membranes can hold it no longer, and then eject it when the membranes

are burst. A plant is oviparous when it yields seed; viviparous when it produces a gem, a bud, a bulb, or an eyed root. The membranes of the seed being removed, an incipient embryo is seen through the microscope.

Some animals, according to the season, eject the embryo inclosed in its membranes, or retain it in the uterus till the membranes are broken. These are the animals which are said to be oviparous at one period and viviparous at another. The spider-flies retain their young till they be as large as the natural size of their own bodies, and have undergone all their transformations within the expansile membranes of the egg, and an uterus as expansile as the stomach of a serpent.

In most cases generation requires a temporary union of two sexes: but it has been said, that in Senegal there is a species of shell-fish among whom this operation is the joint work of three individuals. In our own country, too, three frogs are frequently observed adhering together, though the labours of the third have generally been thought more officious than necessary. In some animals the sexual union is almost instantaneous. It constitutes nearly the business of life in the last stage of the ephemeron; and the male both of the frog and toad often continues on the back of the female not for hours and for days only but for some weeks. Upon examination it has been found, that with his fore-feet he assists the female to protrude her eggs through the windings of the oviduct; and when they at last arrive at the anus, a species of the toad has been observed to draw them out with his hind legs. These animals were probably the first of the masculine gender who practised this art. But due honour has not been ascribed to the discoverers. In former days, the generous and grateful spirit of the ancients made them ready to acknowledge their obligations to different animals for the arts of bleeding, clystering, and purging; but such is the degeneracy of modern times, that many write only to claim the discoveries of others. On this account we ought not to wonder that many accoucheurs, in publishing encomiums on their own merit, have invidiously concealed the superior pretensions of the obstetrical toad.

Among all living bodies the two sexes are generally similar; and the male sex generally distinguished by superior strength, beauty, and courage. The law, however, does not hold universally. The females of some carnivorous animals, who are left by the male to provide for their offspring, are larger, stronger, and more ferocious than he. Among some insects the male and female have no similarity even in form. The male of the glow-worm is a beetle, which flies in the dark, and is attracted not by the form, but the brilliancy of his mistress (c). The female gall insect is a large mass like a vegetable

(c) Such glowing beauty allures enemies as well as lovers. "In Jamaica, in some seasons of the year, (says Dr Darwin), the fire-flies are seen in the evenings in great abundance. When they settle on the ground, the bull-frog greedily devours them; which seems to have given origin to a curious, though cruel, method of destroying these animals: If red-hot pieces of charcoal be thrown towards them in the dusk of the evening, they leap at them, and, hastily swallowing them, are burnt to death." *Botanic Garden*. From this fact the romantic moralist and spiritualizer might derive some hints for amusing declamation; and in their dissuaves might plausibly demonstrate, that in most cases beauty is fatal to the object beloved, to the lover, and destroyer.

Genera-
tion.

275
Male and
female
parts of
animals.

276
Their situa-
tion.

277
Androgy-
nous ani-
mals.

† *Swam-
merd. Hist.
of Insects,
p. 1. ch. 9.*

278
Male and
female
parts of ve-
getables.

279
Parts of ge-
neration
change, and
sometimes
disappear.

vegetable excrecence, without locomotion; the male a small fly full of activity. The one is as unlike to the other as a Harpy to a Venus, and as disproportioned in point of bulk as a horse to an elephant.

In many animals the distinctions of sex are concealed in the body. When any of their parts are placed externally, or protruded occasionally, the male parts are usually prominent, and the female hollow, in order to receive them. In the acari, however, in many flies, and a few hornets, the case is reversed; the female parts suffer erection, and the male parts are open and hollow for their reception.

The external situation of these parts is very much varied in different animals. In many worms it is near to the head. It is often upon the side of the snail; near to the breast in the female of the dragon-fly. It is at the extremity of the antennæ in the male spider. The vulva enters from the rectum in birds. Its common situation in most animals is well known. —The male penis, where there is one, is sometimes found to enter the vulva, and sometimes not: it is sometimes imperforated, sometimes forked, sometimes double, sometimes fleshy, sometimes bony, sometimes straight, sometimes winding spirally like a screw, sometimes with a knob and sometimes with a point at its extremity, according to the kinds and varieties of animals.

Few individuals have more than one sex. Many snails, however, are androgynous, and have two. In copulation they perform the office of two sexes, and are mutually impregnated†. This circumstance has often led the sensualist to wish that he were a snail. With equal reason the Epicure might wish to be one of those worms that imbibe by absorbents, and suck in nourishment by a thousand mouths. The organs employed may be more in number, the continuance of their function may be much longer, and yet the gratification may be less. The discreet beauty can afford a million of pleasures to her lover which no snail or sensualist enjoys, and which prostitution can never yield.

The male and female parts of the vegetable are sometimes both on the same flower, sometimes on separate flowers, and sometimes even on different plants of the same species. Besides the flower, another organ of generation is found in vegetables. This is the corona, from which the buds and branches proceed. It is a substance between the pith and the ligneous circles, and from which the diametral insertments diverge.

The corona is most conspicuous at the time when it sends forth shoots. The flower comes forth only at the time when the seed is to be formed; and the testicles and ovaries of those animals which procreate only at stated periods are diminished in size, and sometimes disappear, till the genial season. Even some females, when they cease to be prolific, as the pheasant, for instance, assume many marks of the other sex, as if their former sex had been assumed only for a while, and to answer some temporary purpose.

In all animals the incipient embryos are perhaps neutrals, and the sex determined according to the predominancy of the male or female stimulus on the parts. It would not a little confirm this opinion, were the ob-

servation to be well founded, that certain bulls are very apt to beget males and others females, and that certain cows which have females always when they are young bring forth males when they grow old. The different proportions of males and females in different climates might also serve to illustrate this doctrine. It is no objection to it that the order of male and female births in the same family is often irregular. The proportional force of the two stimuli will naturally be different at different times. It may depend on the quantity or quality of the fluid secreted, upon the difference of ardour in the parties, on the fancy, the passions, the particular state of the system at the time, and a thousand circumstances, besides the age, and the usual or general habit of the body. We mean only to infer at present, that wherever a male or female is produced, the stimulus of that particular sex, whatever was the cause, had during the time of coition and conception acquired the ascendancy over the parts that were to become sexual in the embryo. We cannot so readily answer the question, Why the offspring should possess the form and dispositions of one parent, and the sex of the other? In this case the different stimuli may have acted differently on different parts; in the case of hermaphrodites, which are very common in the horse, the ass, the cow, and the sheep, the two parents seem to divide the form, the sex, and the dispositions, equally between them.

The particular cause which excites the orgasmus in the female organs is not ascertained. That viscid fluid which young lascivious females eject when fond of the male, is chiefly a secretion from the glands of the vagina, the mouth of the uterus, and the neighbouring parts. In some respects it appears to be similar to those periodical discharges of females which frequently assume the erect posture; and these discharges being usually discontinued during the times of pregnancy and suckling, we must suppose that it is a portion of that fluid which nature has prepared for the use of the fœtus. These discharges are always a proof that the female has arrived at the age of puberty; that her ovary is now performing its office; and that she is disposed to propagate her kind. Whatever be the cause of the female orgasmus, it is often so strong as to counteract the natural effects of the seminal fluid, and prevent impregnation. For this reason, few young and lascivious females conceive immediately after their marriage; and after coition, therefore, in cattle, it is sometimes a practice to beat the female, to plunge her in water, to weary her with running, and to use other means to prevent the return of the sexual desire.

In man, and some of the nobler animals, the influence of fancy over the organs of generation is unquestionably great; but the extent and mode of its agency is not defined. Those who allow it so much power in impressing marks, and altering the form and colour of the fœtus, support their opinion rather by the number than the strength of their arguments. Many of the stories which they adduce as a sort of proofs are evidently fabulous, and have brought the truth of the whole into question. The reports, however, of the French commissioners who were appointed to examine the nature of animal magnetism, ought to deter the can-

Genera-
tion.

280
Incipient
embryos
perhaps
neutera.

281
Female or-
gasmus.

282
Influence of
fancy over
the parts of
generation.

Genera-
tion

did inquirer from drawing very hasty conclusions.— The queries of Fienus (H) concerning the powers of this mental faculty are important and curious, and might be of use in directing our researches; but they ought to be answered by accurate experiments, and not by acute metaphysical reasoning and historical anecdotes that are ill authenticated.

283
The mixture of species prevented, how.

To prevent a confusion of genera and species, animals are generally restricted by propensity to their own kind; and the seminal fluids, besides, being various in various animals, they cannot indiscriminately act as a stimulus on all female organs of generation. The changes of form induced by habit, which is owing itself to the influence of stimuli, will partly explain the manner in which the progeny is made to resemble the male. As the irritability of different parts is of different kinds, the stimulus will have a different effect on different organs; and in these cases where either genera or species are mixed, the parts which are most and least affected by the stimulus of the male will be obvious in the shape and form of the offspring.

284
Generation without sexual distinctions in plants and animals.

We have hitherto spoken of generation as being performed by the temporary intercourse of two sexes; but the puceron is an instance where sexual distinctions are not always necessary. Even where they exist they are daily dispensed with in the vegetable kingdom. Plants grow from the gem, the bulb, the leaf, or the root.— They propagate by slips, by suckers, and by layers, and some of them multiply by spontaneous separation (1). In many animals the distinctions of sex are totally unknown. It has been observed, that infusory animalcules multiply their species by continual divisions and subdivisions of their own body; that some polypes, by spontaneous separation, split transversely,

some longitudinally, and that some send off shoots. When experiments have been made upon these animals, it has been discovered that the numerous and artificial divisions of their body or their head produce entire animals. Trembley learned that they might be engrafted upon one another, and produce monsters as wild and extravagant as poet or fabulist has ever dreamed of.

It was noticed already that the alimentary canal of some animals distributed nourishment through the whole body without the intervention of circulating vessels, and that the vital organs of vegetables were generally diffused through the whole system. The case is the same in polypes as in plants. Every part is a miniature of the whole. It is found to have similar organs of digestion, of respiration, of circulation, and of generation. In perfect animals all the parts are more dependent on one another; the vital organs have distinct situations, and their powers are concentrated in distinct places. The arm of a man has no heart; it has no lungs; it has no stomach, and no organs of generation; but the branch of a tree has as complete a system of organs as the trunk itself, and is as independent of that body from which it grew as the graft is independent of the stock.

The several parts of perfect animals all contribute to make one whole; the several parts of a plant or polype, when united together, form only a congeries of living bodies. These facts contribute to explain the principal phenomena in this mode of propagation.

SECT. XIII. Sleep.

SLEEP is rather an affection of mind than a property of body, and is therefore more naturally a subject of metaphysics.

(H) The small work of Fienus to which we allude is intitled *De Viribus Imaginationis Tractatus*. The following questions serve to give an idea of its contents, and are named *Index Questionum hujus Libri*.

- Quaestio*. I. An anima habeat vim agendi in ullum corpus?
 II. In quæ corpora agere possit, et qua actione?
 III. Per quas potentias illos motus et actiones exerceat?
 IV. An anima agat aliquid per potentiam imaginativam?
 V. An phantasia possit ullum corpus movere localiter?
 VI. An possit alterare?
 VII. An phantasia possit vim ullam acquirere ab influxu cælorum?
 VIII. An ergo phantasia nullam habeat vim agendi?
 IX. Per quas potentias phantasia corpora immutet?
 X. Quid possit in corpus proprium, et specialiter, an possit in eo creare morbos?
 XI. An possit morbos creare?
 XII. Quid possit in alienum externum?
 XIII. Quid possit in alienum propinquum seu fœtum?
 XIV. Quomodo et qua ratione fœtum immutet?
 XV. Quomodo possit conformatricem dirigere?
 XVI. Quænam imaginatio habeat illam signandi potestatem? quæ non?
 XVII. Cur non omnis imaginatio quam animi passionibus sequuntur signat?
 XVIII. An omnes animi passionibus signant?
 XIX. Quænam imaginatio signet, an tantum matris an etiam patris?
 XX. An etiam brutorum imaginatio signet?
 XXI. Quò tempore signet, an tantum graviditatis, an etiam conceptus?
 XXII. Quantam permutationem possit in fœtum inducere, et quas signaturas possit causare?
 XXIII. Cur phantasia non semper imprimit in fœtum res imaginatas eodem modo, sed sæpe tam diversis?
 XXIV. Cur non eidem semper parti sed diversis notæ inducuntur?

(1) As the house-leek and some grasses.

Sleep. metaphysics than of physiology. This affection is often induced by fatigue and exercise; and several persons, when they are weary and no longer able to move their limbs, say they are exhausted. Though the word *exhausted*, in this expression, has seldom any precise meaning, it seems, however, to have been the means of suggesting a theory with regard to sleep. This theory supposes that sleep is occasioned by the exhaustion of irritability in the living system; but it seems to be founded on very limited and partial observations, or rather has been formed, like a great many others, prior to any observations at all, and afterwards tortured to account for facts which it does not comprehend. It does not account for the periodical returns of sleep, for the almost unremitting drowsiness of infants, and for that listless lethargic inaction so often attendant on old age. When no exhaustion of irritability can well be supposed to have taken place, the propensity to sleep on many occasions becomes irresistible, from the effects of monotonous speaking, from stillness, darkness, or from the sameness of scenery around us; and when one stimulus, after long application, can rouse no more (a plain proof that the irritable principle is by no means exhausted), another stimulus that is less powerful in ordinary cases is accompanied with excitement.

288
An affection of mind.

289
Favours nutrition.

290
Sleeping and waking each suited to different functions in the system.

Of these phenomena, we frankly confess that we can assign no physical cause that is satisfactory. It is easy, however, to see the intention which nature has in view by inducing sleep. It has long been observed, that in all living bodies there is a continual waste and repair, or, to speak with more precision and accuracy, one process of assimilation and another of dissolution constantly taking place in all the different parts of the system. It is also true that this assimilation, when the body is healthy, predominates in youth; that dissolution prevails in old age; and that the two are nearly on a par during the vigour and meridian of life. Another fact which admits of demonstration is, that a gentle and moderate exertion of mind and body will promote both. And lastly, it is certain that immoderate exertion in either respect, or any exertion that is not suited to our strength, habits, or period of life, prevents assimilation, hastens dissolution; and that the means which nature employs to restore the balance is usually by inducing a state of sleep.

When the balance is restored, and all the parts are again repaired for discharging their office, man awakes; but his waking period is of short duration. If appetite or passion do not engage him in some pursuit, if his mind be not occupied with some object, or if no stimuli be applied from without. This period seems chiefly intended for collecting food, and for being employed in those exertions which promote respiration, digestion, absorption, circulation, and secretion; while sleep, after the food is collected, assists nutrition, and promotes assimilation throughout the system. If what is the natural food of the species cannot be collected by the plant or animal in a short time, the period of sleep is proportionally restricted. If the food received be difficultly assimilated, the period of sleep is proportionally extended. If the food be not prepared for assimilation, the sleep is disturbed. If it be difficultly prepared by the organs, the active exertions are more vigorous; if easily prepared, they are more feeble. If

it be collected during the day, the sleep is in the night; if collected in the night, the sleep takes place during the day; and all living bodies are directed by nature to select that time and species of food which is most suited to their nature, their habits, their circumstances, and age.

To favour nutrition, not only the body, but even the mind, must be allowed to indulge in rest. The child sleeps, and his mental faculties are under restraint, that those functions employed in nutrition may not be disturbed. The mental faculties are still feeble in a more advanced period of life; and the moderate exertions of mind and body which are natural to youth are chiefly such as favour the preparatory organs of the system, and promote growth: but the active and vigorous exertions of manhood, considered with respect to mind or to body, soon cause dissolution to preponderate in the scale, and old age becomes listless, inactive, and drowsy, and the mind returns to childhood or dotage, because living bodies are known to accommodate themselves to circumstances, and because the prevailing dissolution is retarded by the frequent returns of rest and of sleep, which favour so much the assimilating powers, counteract *re-absorption*, and oppose decay.

During sleep the irritable principle is more languid, and all the senses are more obtuse. The mind then is withdrawn to its rest, and does not attend to stimuli from without. The same happens when the mind is absorbed in profound thought: but profound thought is hurtful to the system. The mind then is engaged in pursuits peculiarly its own, and is less attentive to the calls of nature. In the time of sleep it withdraws seemingly, not so much for its own sake as that of the body, which then being freed from the interruption of voluntary motions, all those organs which act spontaneously can more easily discharge their functions.

For the best of reasons, the mind is not allowed to judge for itself when it is proper to eat, to drink, to sleep, to wake, and to propagate the species. These and the like are offices too important to be wholly intrusted with a being of so very limited intelligence. In all these cases, it is therefore directed by certain propensities resulting from the body in consequence of stimuli or organic structure. Being often amused with thoughts and ideas on those objects which are purely intellectual, as the notes of memory, the forms of fancy, and its own operations in the way of reasoning; being invested with some little power in rousing, calming, and regulating the passions, the desires, and appetites; and having the command of all the voluntary movements of the body; it sometimes neglects its charge of the system, destroys it sometimes by excessive indulgence, and sometimes employs it in accomplishing ends peculiarly its own. One should imagine that the mental principle in the lower animals should occasion but little disturbance to the system; yet it has been observed that geese fatten sooner in the dark than they do in light, where the mind is entertained with varieties of objects: and this circumstance will partly explain why man does not fatten so regularly as the brute, and why castration, which prevents so much anxiety and passion and exhausting efforts, assists growth and the organs of nutrition. The venereal stimulus, for this reason, is not strongly felt at a very early period of youth, nor is very troublesome in old age. In the former case it

Sleep.
291
Violent exertions of mind or body hurtful to the system.

292
Mental exertion counteracts nutrition.

293
Charge of the system not contracted by the mind, therefore

Sleep.

would prevent the growth of the system; in the latter it would hasten its dissolution.

²⁹⁴
The system
accommo-
dates with
respect to
sleep.

The natural returns of waking and sleeping may be altered by the presence or absence of stimuli, and are curiously affected by the influence of habit. Although the commencement of one of these periods happen to be changed, the commencement of the other will continue as before. If a person be accustomed to sleep precisely at nine in the evening, and to rise again at six in the morning, though his sleep in the evening may now and then be kept off till twelve, he will waken at six; and though continued by darkness, quietness, or such like causes, till the day be advanced, it will recommence in the evening at nine. The state of physiology is such at present that we cannot assign any precise physical cause for the natural kinds of sleeping and waking, or for their regular periods of return. As for the causes which occasion morbid sleeping and waking, we refer our readers to books on pathology.

²⁹⁵
Sleep of
plants.

Plants too have been said to sleep. At the approach of night, many of them are observed to change their appearances very considerably, and sometimes even to such a degree as scarcely to be known for what they were before. These changes happen principally to the leaves and the flowers. During the night, many leaves, according to the nature and genus of the plant, are seen to rise up, to hang down, or to fold themselves in various ways for the protection of the flowers, the buds, the fruits, or young stems; and many flowers, to escape a superabundance of moisture, to hang down their mouths towards the earth, or wrap themselves up in their calices. It was mentioned already, that these phenomena are owing to stimuli acting from without: we may add here, that most of the motions are performed at the joints where the leaves and petals articulate with the stem. A period of rest is as necessary to plants as sleep is to animals. The irritable principle cannot act long under the influence of the same stimulant, except at intervals; and the rapid growth observable in plants during the night, is a strong proof that the organs employed in assimilation had been disturbed in discharging their functions during the day, when exposed to the actions of heat and light and of other stimulants.

SECT. XIV. *Death.*

²⁹⁶
Death.

DEATH is the cessation and total absence of the living principle in organized bodies. It is sometimes imitated by sleep and swoons; and a state of torpor in many instances can hardly be distinguished from it. Several mosses and a few animals, as the ears of blight-

ed wheat, the seta equina, the wheel polype, and some snails as we learn from the Philosophical Transactions, may be safely preserved as dried preparations, not for months only but for years; and after irritability and sensation have been totally suspended, will return to life upon the proper application of moisture. A wheel polype was put by Fontana upon a bit of glass, and exposed during the whole summer to the noonday sun; another was exposed in a similar manner for a year and a half; and after they were like a piece of hardened glue, were restored to the use of all their functions by a few drops of water (κ). Wherever there is death, there must therefore be likewise a partial or general decomposition of one or more of the vital organs. This decomposition takes place naturally in some living bodies after a few hours, in some after a few days; the life of others is extended to weeks; some are vigorous for months or a season. Man has often seen more than fourscore; and the hardy oak survives the shock of two or three centuries. These observations conspire to show that there is a certain period of existence allotted by nature to every species of living bodies. In the individual this period is sometimes abridged, and may be sometimes extended by circumstances; but yet there is a bound which it cannot pass, when the vital organs must be decomposed, and the system return to moulder with the dust. The time of incubation and the time of gestation are pretty much defined in every species, because the circumstances of the individual in these cases are generally similar; but after emerging from the foetal state, the individuals are partly entrusted to their own organs and the chances of life, which are much varied; and hence we account for the difference of their age.

Life in general seems to be proportioned to the space occupied by that series of functions which the species is evidently destined to perform: and here sometimes the accommodating principle is singularly remarkable. As the period of decay is never seen to commence in the species till that of propagation be nearly elapsed, and as propagation in the lower tribes of plants and of animals is often the immediate harbinger of death; so many animals which have not propagated, indulged the propensity, nor became uneasy from the languor of desire, continue vigorous longer than ordinary, as if it were waiting for an opportunity to multiply their kind. And in the vegetable kingdom, where no individual is ever the victim of desire or passion, annuals, if prevented from flowering and seeding in their proper season, will live double, and sometimes triple, the usual time, till these functions be

(κ) Father Gumillo a Jesuit, and the Indians of Peru, says Dr Fowler, are quoted by Fontana, on the authority of Bouguer, as speaking of a large and venomous snake, which being dead and dried in the open air or in the smoke of a chimney, has the property of coming again to life on its being exposed for some days to the sun in stagnant and corrupted water. But, adds the Doctor, it would almost require the credulity of an Indian to credit the testimony of the Jesuit. *Experiments and Observations relative to Animal Electricity*, by Richard Fowler.—With regard to this report, we shall only observe, that the snake would not readily return to life after it was dead: but if the Jesuit meant only that it recovered after it was dried, and its several functions had been suspended, we must say, that if his report be not sufficiently authenticated, neither has it been sufficiently disproved.

Death. be somehow performed, and then die. But when all the organs are fully evolved and have discharged, or have continued for the usual time capable of discharging, those offices for which they were intended; dissolution commences, the assimilating organs begin gradually to lose their tone, and the reabsorbents carry off more from the different parts than what they receive in the way of nutrition: the irritable fibre then becomes rigid; the membranes and cartilages begin to ossify; the bones grow harder; the smaller vessels collapse and disappear; the parts no longer are obedient, as before, to the action of stimulants; and death ensues. Some, in order to account for this event, imagine that the body receives at first a certain portion of irritabi-

lity, and continues to live till that be exhausted: but this theory explains nothing; and without pretending to a great deal of foresight, we will venture to predict, that for all the irritability which it has, it will not be distinguished for its longevity.

With regard to the periods by which the life, the functions, and diseases of living bodies are so frequently regulated, and which periods may sometimes be varied but not evaded, the most prudent language that, perhaps, can be adopted in the present state of physiological science is this of the Divine, That the God who formed us hath numbered our days, determined our times, and prescribed the limits of our existence.

Death. 302 An attempt to account for death.

303 Physical causes not easily assigned for periodical phenomena in the system.

The following TABLE may be considered as in some respect a summary view of the foregoing Sections, and as a Supplement to the Table of D'Azyr.

1. RESPIRATION.	Some living bodies have respiratory organs (L)	Diffused through the system.
		Confined to one place.
2. DIGESTION.	Some living bodies have an alimentary canal	Situated externally.
		Situated internally.
		In the course of circulation.
		Not in the course of circulation.
		Within or without the course of circulation at pleasure.
		Without tracheæ (M).
		With tracheæ ramified through the system where the respiratory organs are generally diffused.
		— not ramified through the system where the respiratory organs are confined.
		— formed by rings.
		— by segments of rings on one side, and a membrane on the other.
		— by continuous rings running spirally like a screw.
		— admitting air by one entrance.
		— by several entrances.
		— wholly concealed in the body.
		— partly projecting from the body.
		— opening at the head.
		— at the opposite extremity.
		— upon one side.
		— upon both sides.
		Without teeth.
		With teeth in the mouth.
		— in the stomach.
		— stones or artificial teeth in the stomach.
		— glands in the mouth for secreting a liquor to be mixed with the food.
		— pouches in the mouth where the food is kept and moistened.
		— a sac or bag where the food is kept and moistened.
		— a membranous stomach.
		— a muscular stomach.
		— an intermediate stomach.
		Without a cœcum or blind gut.
		With a cœcum.
		— two cœca. } These parts, as well as
		— three cœca. } ruminating stomachs and
		— four cœca. } their œsophagus, have an-
		— one entrance or mouth. } tiperistaltic motions.
		— many entrances by absorbents.

Plants

(L) The gentlemen of the French Academy, who have been attentive to mark the number of lobes in the lungs and livers of different animals, have sufficiently demonstrated, by the facts which they relate, that many of those physiological conclusions which have been drawn from the number of lobes in these two viscera, are just as delusive as many of those which have been drawn from the number of lobes and the different tubercles found in the brain.

(M) Where the respiratory organs are situated externally.

DIGESTION. } Plants have many alimentary canals (N).
 } Some polypes have alimentary canals that branch through the body.
 } The alimentary canals of plants, of some polypes, and worms, distribute the fluids without the aid of a circulating system.

3. ABSORPTION. } Performed { By vessels beginning from the alimentary canal.
 } { _____ from the cavities.
 } { _____ from the surface.
 } { — veins in the penis and placenta.
 } { — reabsorbents originating from all the parts of the system.

4. CIRCULATION. } Some living bodies have { No circulating system.
 } { A circulating system with one heart.
 } { _____ a heart for distributing the blood through the respiratory organs, and an artery for distributing it through the system.
 } { _____ one heart for the respiratory organs, and one for the system, both in one capsule.
 } { _____ two hearts for the respiratory organs, and one for the system.
 } { _____ a pulmonary heart, or a heart for the respiratory organs in the course of circulation.
 } { _____ a pulmonary heart within or without the course of circulation pleasure.
 } { _____ a heart situated in the breast.
 } { _____ near to the head.
 } { _____ in the opposite extremity.

5. NUTRITION. } The food is prepared { By the alimentary canal.
 } { — the lacteals.
 } { — the respiratory organs.
 } { — the circulating system.
 } { — the cellular membrane.
 } { — glands.
 } { And by the several parts in which it becomes finally assimilated.

6. SECRETION. } Performed { By vessels.
 } { — exhaling vessels.
 } { — excretory organs.
 } { — organic pores.
 } { — glands.
 } { And by all the parts of which the system is composed.

7. INTEGUMENTATION (O). } Some living bodies have integuments { Which are scaly.
 } { _____ shelly.
 } { _____ membranous.
 } { _____ corneous.
 } { _____ cretaceous.
 } { _____ ligneous.
 } { _____ covered with down.
 } { _____ hair.
 } { _____ prickles.
 } { _____ feathers.
 } { _____ a viscid matter.
 } { _____ change their colour.
 } { _____ their covering.
 } { _____ are changed themselves.

8. IRRITATION.

(N) The subterraneous bulbs, the swollen fleshy parts of the roots, and certain cups and vesicles which contain water, serve often as reservoirs of food to the plant, although for various reasons we have not ventured to call them stomachs. *Stomach* would be a vague and unmeaning word were it applied even to all those reservoirs of water or secreted fluids which we find in fishes, and by which some of these animals are preserved alive on the dry shore till the tide return.

(O) There seems to be a want of precision in classing bones with integuments, or integuments with bones, as

8. IRRITABILITY.	The irritable principle effected	By stimulants invisible.
		— — — — — unknown.
		— — — — — unthought of.
		— the nervous influence.
		— light.
		— heat.
		— moisture.
		— electricity.
		— salts.
		— gases.
		— bodies that act mechanically.

9. MOTION.	Locomotion performed	By legs.
		— wings.
		— fins.
		— the tail.
		— organs which fall not properly under these descriptions.
		— the springiness of the body or of some part of it.
		— contrivances which fit living bodies for being moved by foreign agents (P).

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4 Y

10. HABIT.

is done in D'Azyr's table. Comparatively speaking, bones are confined to a few genera of living bodies, and are never subject to periodical changes like the integuments or cuticular coat of the alimentary canal in some animals.

For the sake of perspicuity, it could have been wished that either anatomists or physiologists had defined bones in a manner different from what they have done, and as far as possible avoided those loose and inaccurate expressions which disgrace science; for some speak of animals having their bones, by which they mean shells, on their outside, and the muscles within them. Some speak of solid and compact bones that were once cartilages, membranes, nay a mere jelly; and some speak of bones in general as the hardest, most solid, and most inflexible parts of the organized body. From all this we are led to infer, that integuments, if hard, solid, and inflexible, may be called bones; that the heart and blood-vessels, if converted into a hard, solid, and inflexible substance, may be called bones; and that a jelly, a membrane, or a cartilage, if it can be supposed that in the course of nature they will become hard, solid, and inflexible, may likewise be called bones. But certainly if hardness, solidity, and inflexibility, be to constitute the characteristics of bones in a living body, however often we may be necessitated to include shells, wood, horns, and stony concretions, under that denomination, we can never with propriety speak of bones that are cartilaginous, membranous, or even a mere jelly. These expressions might be proper enough were ossification considered merely as a natural or accidental circumstance, and were bones defined to be those internal parts of an animal which are intended by nature to form what is meant by the skeleton in its usual sense. These parts, we know, after passing through the forms of jellies, membranes, and cartilages, often become hard, solid, and inflexible, from ossification; a species of induration which is natural to the parts which form the skeleton of some animals, an induration which occasionally is extended to other parts, which sometimes exhibits the appearance of crystallization, and in many respects is different from the manner in which the wood of vegetables and the shells of animals become hard.

Ossification does not interfere so much as may be commonly imagined with the structure of bones: the structure of bodies may often be similar, and yet their mode of induration be different. Bones have been observed to consist of laminæ, or plates like shells, and cylindric bones of concentric circles like wood. The concentric circles of wood have been found to consist of indurated membranes, which they receive successively from the bark; and Swammerdam discovered that the shells of some fishes were composed of laminæ that consisted likewise of indurated membranes, or hardened cuticles, that had been successively furnished by the body. It has thence been supposed that bones, though hardened in a different manner, are of a structure nearly similar to that of some ligneous bodies and shells, and that their laminæ in many instances consist also of indurated membranes, supplied successively by the periosteum when it is present. When it is absent, nature, which accommodates herself to circumstances, can form the bone in another way, and afterwards cover her new productions with a periosteum. For many excellent physiological observations on bones, we refer our readers to the *Osteology* of the late Dr Monro, and particularly to the volume already published of Mr Bell's *System of Anatomy*.

(P) The pulp which surrounds seeds is often the means of their propagation. Animals swallow the seeds for the sake of the pulp; and the seeds remaining indigestible, are carried to a distance, and discharged with the feces.

10. HABIT	Accommodates with respect	- To respiration. — digestion. — absorption. — circulation. — nutrition. — secretion. — integumentation. — irritability. — motion. — transformation. — generation. — sleep. — death. — form. — size. — climate. — propensity. — the healing of parts that are morbid. — the renewal of those that are broken off.
11. TRANSFORMATION	Takes place	- By a change of proportion among the parts. — of their form. — throwing off old parts. — an addition of new ones of a different use, structure, and form. — a change of the whole form together. — of qualities, propensities, manners.
12. GENERATION.	Performed	- By the temporary union of two sexes. — the spontaneous separation of parts. — organs situated in the breast. — in the side. — near to the head. — in the opposite extremity. — an intransient organ of the male and a recipient organ of the female. — an intransient organ of the female and a recipient organ of the male. — the stamina and pistils of flowers. — the femoral secretion of the male thrown into the organs of the female. — sprinkled at the entrance of the female organs. — thrown upon them from a distance. — transported to them by the winds. — sprinkled on the embryo after emission. — dissolved in a fluid secreted by the female before it can rightly perform its office. — dissolved in water. — dissolved perhaps sometimes in air, as in the case of dioecious plants, where it probably acts like an aroma.
13. SLEEP.	Natural sleep is occasioned	- By quietness. — the absence of stimuli. — the sameness of stimuli when long continued. — deficient assimilation. — deficient irritability, which is owing sometimes to the weakness, inattention, or confined powers of the mental principle.
14. DEATH.	Happens naturally to some species of living bodies	- After hours. — days. — weeks. — months. — seasons. — years. - Not till after centuries.

All living bodies are much exhausted after performing the act of generation, and many of the inferior plants and animals begin immediately to sicken and decay.

We conclude by confessing, that concerning many uses of the parts, and concerning different species of variety in the form, structure, and position of the organs, much, after all, is still reserved for farther reading, for farther observation, and for future physiological arrangement.

P I A

Phytolacca
||
Piacenza.
Bryant's
Flora Dia-
tetica.

PHYTOLACCA, *POKEWEE*D, or *American nightshade*, in botany, is of the decandria icofandria class of plants. It grows naturally in the province of Virginia in America. It hath a thick, fleshy, perennial root, divided into several parts as large as middling parsneps. From this rise many purplish, herbaceous stalks, about an inch thick, and six or seven feet long, which break into many branches, irregularly set with large, oval, sharp-pointed leaves, supported on short footstalks. These at first are of a fresh green colour, but as they grow old they turn reddish. At the joints and divisions of the branches come forth long bunches of small bluish-coloured flowers, consisting of five concave petals each, surrounding ten stamina and ten styles. These are succeeded by round depressed berries, having ten cells, each of which contains a single smooth seed.

In Virginia and other parts of America the inhabitants boil the leaves, and eat them in the manner of spinach. They are said to have an anodyne quality, and the juice of the root is violently cathartic. The stems when boiled are as good as asparagus. The Portuguese had formerly a trick of mixing the juice of the berries with their red wines, in order to give them a deeper colour; but as it was found to debase the flavour and to make the wine deleterious, the matter was represented to his Portuguese Majesty, who ordered all the stems to be cut down yearly before they produced flowers, thereby to prevent any further adulteration. The same practice was common in France till it was prohibited by an edict of Louis XVI. and his predecessor under pain of death. This plant has been said to cure cancers; but the truth of this assertion has not been indisputably proved, and does not appear very probable.

PHYTOLOGY, a discourse concerning the kinds and virtues of plants. See **BOTANY**, and **MATERIA Medica**.

PHYTON, a general of the people of Rhegium against Dionysius, the tyrant of Sicily. He was taken by the enemy, and tortured, and his son was thrown into the sea. See **SYRACUSE**.

PIA MATER. See **ANATOMY**, n° 130. p. 756, &c.

PIABA, in ichthyology, is a small fresh-water fish, caught in all the rivers and brooks in the Brasils, and in some other parts in America. It is about the bigness of the common minnow; is well tasted, and much esteemed by the natives.

PIABUCU, in ichthyology, is an American fish eaten in many places by the natives. It is ravenous, and so greedy of blood, that if a person goes into the water with a wound in any part of his body, the piabucu will make up to it to suck the blood. It seldom exceeds four inches in length.

PIACENZA is a city of Italy, in the duchy of Parma, in E. Long. 10. 25. N. Lat. 45. It is a large handsome city, whose name is derived by some from its pleasant situation, in a fruitful plain, on the Via Æmilia, about half a mile from the Po. It is the see of a

P I A

bishop suffragan of Bologna, and has a university, but of no great fame. It is defended by a wall and a strong citadel, and is reckoned about three miles in circumference, so that it is somewhat bigger than Parma. The houses are low, but prettily built; the great street called the *Stradone* is in a direct line and of equal breadth, with a foot-way fenced with posts on each side like London, and is about 3000 feet long. The houses are generally built of brick, and some of them are prettily painted. The cathedral is an old structure, but well adorned within. The duke of Parma, who is sovereign of Piacenza, has a palace in the city built by Vignola. There are many excellent paintings in this place. There are two chapels painted, one with the history of St Catharine, and the other with a picture of Christ, as also the altar of the church of St Augustin, all by Pordenone. In the same church there is a fine picture of the blessed virgin, St Peter, and St Paul, by Paolo Veronese. At the Capuchins there is a Francis by Guercino. There is a fountain said to have been erected here by Julius Cæsar, and the equestrian statues of the famous general Alexander I. duke of Parma and Placentia, and of his son Ranuccio, both in the great square. In the palace of Scotti, there are a great many fine pictures by Lanfranco, who had been a page in their family, and among the rest the rape of Helen, the taking of Troy, the blessed virgin, and St Francis. The trade of this city consists chiefly in their cheese, as at Parma, these cities being surrounded with the richest pasture grounds in Italy; though the greatest part of what we call the Parmesan cheese is made in the duchy of Milan, and particularly at Lodi. See **PARMESAN CHEESE** — Without the walls, which are washed by the rivers Trebbia and Po, there is a large seminary or college, magnificently erected by cardinal Alberoni, a native of this city, but considerably hurt by the modern Goths in the last war. Towards the north of the city is the mouth of the river Trebbia, famous for the victory which Hannibal obtained over the Romans.

PIASTUS, a native of Poland, was originally a wheelwright and the son of Cossico, a citizen of Cracow. He flourished in the year 830, when on the extinction of the family of Popiel great disputes arose about his successor, and Cracow was afflicted with a severe famine. During this extremity, when the people were dropping down in the streets, two angels in human forms, as the story is told, took up their residence with Piastus, who was celebrated for his piety and extensive charity. He had nothing left but a small cask of the common liquor of the country, and this he presented to his new guests, who, charmed with his hospitality, promised him the crown of Poland. The faith of Piastus was equal to his other virtues: he implicitly believed the word of his guests, and piously followed their directions in every particular. He was ordered to distribute the liquor out of his little cask to the multitude: he did so, and found that it was inexhaustible. The people were astonished; all cried out,

Piacenza,
Piastus.

Mod. Univ.
History,
vol. xxx.
p. 336,
&c.

Piaſtus
||
Pibroch.

"A miracle!" and the electors determined to chuſe a perſon in whoſe favour Heaven had ſo viſibly declared: Piaſtus was accordingly taken from his ſhop, and raiſed to the ducal dignity.

Such is the relation of the canon of Cracow, which differs in many particulars from the account given by Guagnini, and ſeveral other hiſtorians. According to them, Piaſtus had prepared a ſmall collation, to entertain ſome friends who were aſſembled at the birth of a child. Two pilgrims, Paul and John, afterwards murdered at Rome, came about this time to Cracow. They begged charity at the door of the election-hall, and were rudely repulſed; upon which they ſtumbled on the houſe of Piaſtus, and were kindly received. The miracle we have mentioned was wrought by them; and the two pilgrims, and not angels, were the inſtruments of the elevation of the hoſpitable wheelwright. Though we pay but little regard to the marvellous means by which Piaſtus aſcended the ducal throne of Poland, it would be preſumptuous entirely to omit a fact attested by all the writers upon this ſubject: it was proper, therefore, to take notice of it, and we leave the reſt to the reader's judgment.

Being now raiſed to the ſupreme dignity, he was not intoxicated with his proſperity. His natural charity, benevolence, and ſweetneſs of diſpoſition, remained: nothing was altered but his power of doing good. He was truly called the father of his people: the injured never returned unredreſſed, nor merit unrewarded. Piaſtus wiped the tear from the eyes of the widow; and was himſelf the guardian of the orphan, and the general patron of the poor and diſtreſſed. His excellent inclinations ſerved him in the room of great abilities; and the happineſs that his people enjoyed made them forget that their prince was not born a ſtateſman and a warrior. Several inſteline commotions aroſe during his adminiſtration, all which he quelled by the mildneſs and clemency of his nature: his nobility were aſhamed of rebelling againſt a ſovereign who devoted his whole life to render his people happy. He removed the court from Crufwitz, a city which he deteſted, becauſe it was the ſcene of Popiel's crimes and tragical end, and fixed his reſidence at Gneſna, where he died beloved, eſteemed, and even adored by his ſubjects.

It is in memory of this excellent prince, that all the natives of Poland, who have been ſince promoted to the ducal or regal dignity, were called Piaſtes, in contradiſtinction to the foreigners.

Piaſtus aſſociated his ſon Ziemovitus with him in the government before his death; a circumſtance of much benefit to the people.

PIAZZA, in building, popularly called *piacbe*, an Italian name for a portico, or covered walk, ſupported by arches.

The word literally ſignifies a broad open place or ſquare; whence it alſo became applied to the walks or porticoes around them.

* *Effays by*
Dr Beattie,
8vo edit.
p. 422.
note.

PIBROCH, ſays Dr Beattie *, is a ſpecies of tune peculiar, I think, to the Highlands and Weſtern Iſles of Scotland. It is performed on a bagpipe, and differs totally from all other muſic. Its rythm is ſo irregular, and its notes, eſpecially in the quick movement, ſo mixed and huddled together, that a ſtranger finds it almoſt impoſſible to reconcile his ear to it, ſo as to

perceive its modulation. Some of theſe pibrochs, being intended to repreſent a battle, begin with a grave motion reſembling a march, then gradually quicken into the onſet; run off with noiſy confuſion and turbulent rapidity, to imitate the conflict and purſuit; then ſwell into a few flouriſhes of triumphant joy; and perhaps cloſe with the wild and ſlow wailings of a funeral proceſſion.

PICA, in ornithology. See CORVUS, ſp. 9.

PICA *marina*, in ornithology. See HÆMATOPUS, and ALCA, n° 3.

PICA, in medicine, a depravation of appetite, which makes the patient long for what is unfit for food, or incapable of nourishing; as chalk, aſhes, coals, plaſter-lime, &c. See MEDICINE, n° 371.

PICA, or *pye*, had formerly the ſame ſenſe as *ordinal*, meaning a table or directory, pointing out the order in which the devotional ſervices appointed for different occaſions were to be performed. Accordingly we are told it is derived from πικα, a contraction of πικα, a table; and by others from *litera picata*, a great black letter at the beginning of ſome new order in the prayer. The term was uſed in a ſimilar ſenſe by officers of civil courts, who called their kalendars or alphabetical catalogues directing to the names and things contained in the rolls and records of their courts the *pyes*.

PICARD, a native of the Netherlands, who founded a ſect the profeſſors of which were called *Picards*. See PICARDS.

FICARD (John), an able mathematician, and one of the moſt learned aſtronomers of the 17th century, was born at Fleche, and became prieſt and prior of Rillie in Anjou. Going to Paris, he was in 1666 received into the Academy of Sciences in quality of aſtronomer. In 1671, he was ſent, by order of the king, to the caſtle of Uraniburg, built by Tycho Brahe in Denmark, to make aſtronomical obſervations there; and from thence he brought the original manuſcripts wrote by Tycho Brahe, which are the more valuable as they differ in many places from the printed copies, and contain a book more than has yet appeared. He made important diſcoveries in aſtronomy; and was the firſt who travelled through ſeveral parts of France, to meaſure a degree of the meridian. His works are, 1. A treatiſe on levelling. 2. Fragments of dioptrics. 3. *Experimenta circa aquas effluentes*. 4. *De menſuris*. 5. *De menſura liquidorum & aridorum*. 6. A voyage to Uraniburg, or aſtronomical obſervations made in Denmark. 7. Aſtronomical obſervations made in ſeveral parts of France, &c. Theſe, and ſome other of his works, which are much eſteemed, are in the ſixth and ſeventh volumes of the Memoirs of the Academy of Sciences.

PICARDS, a religious ſect which aroſe in Bohemia in the 15th century.

Picard, the author of this ſect, from whom it derived its name, drew after him, as has been generally ſaid, a number of men and women, pretending he would reſtore them to the primitive ſtate of innocence wherein man was created: and accordingly he aſſumed the title of the *New Adam*. With this pretence he taught his followers to give themſelves up to all impurity; ſaying that therein conſiſted the liberty of the ſons of God; and that all thoſe not of their ſect were in bondage.

He

Pica
||
Picards.

Picards. He first published his notions in Germany and the low countries, and persuaded many people to go naked, and gave them the name of *Adamites*. After this he seized on an island in the river Lausnecz, some leagues from Thabor, the head quarters of Zisca, where he fixed himself and his followers. His women were common, but none were allowed to enjoy them without his permission: so that when any man desired a particular woman, he carried her to Picard, who gave him leave in these words, *Go, increase, multiply, and fill the earth.*

At length, however, Zisca, general of the Hussites, (famous for his victories over the emperor Sigismund), hurt at their abominations, marched against them, made himself master of their island, and put them all to death except two; whom he spared, that he might learn their doctrine.

Such is the account which various writers, relying on the authorities of Æneas Sylvius and Varillas, have given of the Picards, who appear to have been a party of the Vaudois, that fled from persecution in their own country, and sought refuge in Bohemia. It is indeed doubtful whether a sect of this denomination, chargeable with such wild principles and such licentious conduct, ever existed; and it is certainly astonishing that Mr Bayle, in his art. *Picards*, should adopt the reproachful representations of the writers just mentioned: for it appears probable at least that the whole is a calumny invented and propagated in order to disgrace the Picards, merely because they deserted the communion and protested against the errors of the church of Rome. Lasitius informs us, that Picard, together with 40 other persons, besides women and children, settled in Bohemia in the year 1418. Balbinus the Jesuit, in his *Epitome Rerum Bohemicarum*, lib. ii. gives a similar account, and charges on the Picards none of the extravagancies or crimes ascribed to them by Sylvius. Schlecta, secretary of Ladislaus, king of Bohemia, in his letters to Erasmus in which he gives a particular account of the Picards, says that they considered the pope, cardinals, and bishops of Rome, as the true Antichrists, and the adorers of the consecrated elements in the eucharist as downright idolaters; that they denied the corporal presence of Christ in this ordinance; that they condemned the worship of saints, prayers for the dead, auricular confession, the penance imposed by priests, the fasts and vigils observed in the Romish church; and that they confined themselves to the observance of the sabbath, and of the two great feasts of Christmas and Pentecost. From this account it would appear that they were no other than the Vaudois; and M. de Beauobre has shown that they were both of the same sect, though under different denominations. Besides, it is certain that the Vaudois were settled in Bohemia in the year 1178, where some of them adopted the rites of the Greek, and others those of the Latin, church. The former were pretty generally adhered to till the middle

of the 14th century, when the establishment of the Latin rites caused great disturbance. On the commencement of the national troubles in Bohemia, on account of the opposition to the papal power (see *MORAVIANS*), the Picards more publicly avowed and defended their religious opinions; and they formed a considerable body in an island by the river Launitz or Lausnecz, in the district of Bechin, and recurring to arms, were defeated by Zisca. *Encyclop. art. Picards.*

PICARDY, a province in France, is bounded on the north by Hainault, Artois, and the Straits of Calais; on the east by Champagne; on the south by the Isle of France; and on the west by Normandy and the English Channel (A). This province is long and narrow, being usually compared to a bent arm; and in this figure is nearly 150 miles in length, but not above 40 in breadth, and in many places not above 20. It is generally a level country; and produces wine, fruit of all kinds, plenty of corn, and great quantities of hay: but wood being scarce, most of the inhabitants burn turf. They have, however, some pit-coal, but it is not so good as that of England. It was united to the crown of France in the year 1643; and is supposed to contain 533,000 inhabitants.

Its principal rivers are the Somme, the Oise, the Canche, the Lanthie, the Lys, the Aa, the Scarpe, and the Deule.

The situation of this province on the sea, its many navigable rivers and canals, with the industry of the inhabitants, render it the seat of a flourishing trade. In it are made beautiful silk stuffs, woollen stuffs, coarse linen, lawn, and soap; it also carries on a large trade in corn and pit-coal. In the government of Calais and Boulogne are annually bred 5000 or 6000 colts, which being afterwards turned loose in the pastures of Normandy, are sold for Norman horses. The fisheries on this coast are also very advantageous. This province is divided into Upper, Middle, and Lower Picardy; and is again subdivided into four deputy governments. The principal town is Amiens.

PICART (Bernard), a celebrated engraver, son of Stephen Picart, also a famous engraver, was born at Paris in 1673. He learned the elements of his art from his father, and studied architecture and perspective under Sebastian le Clerc. As he embraced the reformed religion, he settled in Holland to enjoy the free exercise of it; where his genius produced those masterpieces which made him esteemed the most ingenious artist of his age. A multitude of books are embellished with plates of his engraving. He died in 1733.

PICCOLOMINI (Alexander), archbishop of Patras, and a native of Sienna, where he was born about the year 1508, was of an illustrious and ancient family, which came originally from Rome, but afterwards settled at Sienna. He composed with success for the theatre; but he was not more distinguished by his genius, than by the purity of his manners, and his regard to virtue. His charity was very great; and was chiefly exerted

Picardy
||
Piccolo-
mini.

(A) The origin of the name of this province does not date earlier than A. D. 1200. It was an academical joke; an epithet first applied to the quarrelsome humour of those students in the university of Paris who came from the frontier of France and Flanders, and hence to their country. *Valesii Notitia Galliarum*, p. 447. *Lorguerac, Description de la France*, p. 52.

Piccolo-
mini.

exerted in relieving the necessities of men of letters. He has left behind him a number of works in Italian. The most remarkable of which are, 1. Various Dramatic Pieces, which laid the first foundation of his character as a writer. 2. A Treatise on the Sphere. 3. A Theory of the Planets. 4. A Translation of Aristotle's Art of Rhetoric and Poetry, in 4to. 5. A System of Morality, published at Venice, 1575, in 4to; translated into French by Peter de Larivey in 4to; and printed at Paris, 1581. These, with a variety of other works, prove his extensive knowledge in natural philosophy, mathematics, and theology. He was the first who made use of the Italian language in writing upon philosophical subjects. He died at Sienna the 12th of March 1578, aged 70. A particular catalogue of his works may be seen in the Typographical Dictionary. There is one performance ascribed to this author, intitled *Dialogo della bella Creanta delle Donne*, (printed at Milan, 1558, and at Venice, 1574, in 8vo.); which but ill suits the dignity of a prelate. It is filled with maxims which have an evident tendency to hurt the morals of young women. Piccolomini's name, indeed, is not in the title page; and it has all the appearance of being a juvenile production. It is very scarce; and the public would sustain no loss by its being entirely out of print. It was translated into French by F. d'Amboise, and published at Lyons, in 16mo, under the title of *Instruction des jeunes dames*. It was afterwards reprinted in 1583, under that of *Dialogue & Devis des Demoiselles*.

PICCOLOMINI (Francis), of the same family with the foregoing, was born in 1520, and taught philosophy with success, for the space of 22 years, in the most celebrated universities of Italy, and afterwards retired to Sienna, where he died, in 1604, at the age of 84. The city went into mourning on his death. His works are, 1. Some Commentaries upon Aristotle, printed at Mayence, 1608, in 4to. 2. *Universa Philosophia de Moribus*, printed at Venice, 1583, in folio. He laboured to revive the doctrine of Plato, and endeavoured also to imitate the manners of that philosopher. He had for his rival the famous James Zabarella, whom he excelled in facility of expression and neatness of discourse; but to whom he was much inferior in point of argument, because he did not examine matters to the bottom as the other did; but pressed too rapidly from one proposition to another.

PICCOLOMINI of Aragon (Octavius), duke of Amalfi, prince of the Empire, a general of the emperor's army, and knight of the order of the Golden Fleece, was born in 1599. He first bore arms among the Spanish troops in Italy. He afterwards served in the army of Ferdinand II. who sent him to the relief of Bohemia, and entrusted him with the command of the imperial troops in 1634. After having signalized himself at the battle of Nortlingue, he made Marshal de Chatillon raise the siege of St Omer. He had the good fortune to gain a victory over Marquis de Feuquieres in 1639: nor did the loss of the battle of Wolfenbuttel, in 1651, impair his glory. He died on the 10th of August 1656, being five years after, aged 57, without issue; and with the character of an able negociator and an active general. The celebrated Caprara was his nephew.

PICCOLOMINI (James), whose proper name was Am-

manati, took that of Piccolomini in honour of his patron Pius II. He was born in a village near Lucca in 1422. He became bishop of Massa, afterwards of Fiescati; a cardinal in 1461, under the name of *Cardinal de Pavie*; and died in 1479, at the age of 57, of an indigestion of figs. He left 8000 pistoles in the bankers hands, which Pope Sixtus IV. claimed; and of which he gave a part to the Hospital of the Holy Ghost. His works, which consist of some Letters, and a History of his own time, were printed at Milan, in 1521, in folio. His history, intitled *Commentaries*, commences the 18th of June 1464, and ends the 6th of December 1469. They may very properly be considered as a Sequel of Pope Pius II.'s Commentaries, which end with the year 1463.

PICCOLOMINI, (Æneas Sylvius). See PIUS II.

PICENTIA, (Strabo, Pliny), the capital of the Picentini, whose territory, called *Ager Picentinus*, a small district, lay on the Tuscan Sea, from the *Promontorium Minervæ*, the south boundary of Campania on the coast, to the river Silarus, the north boundary of Lucania, extending within-land as far as the Samnites and Hirpini, though the exact termination cannot be assigned. The Greeks commonly confound the *Picentini* and *Picentes*, but the Romans carefully distinguish them. The former, with no more than two towns that can be named, *Silernum* and *Picentia*; the situation of both doubtful: only Pliny says the latter stood within-land, at some distance from the sea. Now thought to be *Bicenza*, (Holstenius), in the Principato Citra of Naples.

PICENUM, (Cæsar, Pliny, Florus); *PICENUS AGER*, (Cicero, Sallust, Livy, Tacitus); *Ager Picentium*, (Varro): a territory of Italy, lying to the east of Umbria, from the Apennine to the Adriatic; on the coast extending from the river Aesis on the north, as far as the *Præutiani* to the south. In the upper or northern part of their territory the Umbri excluded them from the Apennine, as far as *Camerinum*, (Strabo); but in the lower or southern part they extended from the Adriatic to the Apennine. A very fruitful territory, and very populous. *Picentes*, the people, (Cicero); from the singular, *Picens*, (Livy): different from the *Picentini*, on the Tuscan sea, though called so by the Greeks; but Ptolemy calls them *Piceni*, as does also Pliny. Their territory at this day is supposed to form the greatest part of the March of Ancona, (Cluverius).

PICHFORD, in the county of Salop in England; on the south-east side of Shrewsbury, near Condover. It is noted for a spring of pitchy water (from whence some derive its name), on the top of which there always flows a sort of liquid bitumen. Over most of the coal pits hereabouts there lies a stratum of blackish rock; of which, by boiling and grinding, they make pitch and tar, and also distil an oil from it.

PICHINCHA, a mountain in Peru. See PERU, n° 56.

PICKERING, in the north riding of Yorkshire in England, 13 miles from Scarborough, and 225 from London, is a pretty large town belonging to the duchy of Lancaster, on a hill among the wild mountains of Blakemore; having the forest of Pickering on the north, and Pickering-common on the south. It is said to have been built 270 years before Christ by Peridurus, a king of the Britons, who was buried here. It had once a castle, the ruins of which are still to be

seen;

Pickery
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Pico.

seen; to whose jurisdiction many of the neighbouring villages were subject: and the adjacent territory, commonly called Pickering-Lath, or the liberty or forest of Pickering; was given by Henry III. to his son Edmund earl of Lancaster. A court is kept here for all actions under 40 s. arising within the honour of Pickering.

PICKERY, in Scots law, petty theft, or stealing things of small value.

PICKETS, in fortification, stakes sharp at one end, and sometimes shod with iron, used in laying out the ground, of about three feet long; but, when used for pinning the fascines of a battery, they are from three to five feet long.

PICKETS, in artillery, are about five or six feet long, shod with iron, to pin the park lines, in laying out the boundaries of the park.

PICKETS, in the camp, are also stakes of about six or eight inches long, to fasten the tent cords, in pitching the tents; also, of about four or five feet long, driven into the ground near the tents of the horsemen, to tie their horses to.

PICKET, an out-guard posted before an army, to give notice of an enemy approaching.

PICKET, a kind of punishment so called, where a soldier stands with one foot upon a sharp pointed stake; the time of his standing is limited according to the offence.

PICKLE, a brine or liquor, commonly composed of salt, vinegar, &c. sometimes with the addition of spices, wherein meat, fruit, and other things, are preserved and seasoned.

PICO, one of the Azore Islands, is so called from some lofty mountains on it; or rather from one very high mountain, terminating like Teneriffe in a peak, and reputed by some writers equal to it in height. This island lies about four leagues south-west from St George, twelve from Tercera, and about three leagues south-east of Fayal; in W. Long. 28. 21. and N. Lat. 38. 29. The mountain Pico, which gives name to the island, is filled with dismal dark caverns or volcanoes, which frequently vomit out flames, smoke, and ashes, to a great distance. At the foot of this mountain towards the east is a spring of fresh water, generally cold, but sometimes so heated with the subterraneous fire, as to rush forth in torrents with a kind of ebullition like boiling water; equalling that in heat, and sending forth a steam of sulphureous fetid vapours, liquefied stones, minerals, and flakes of earth all on fire, in such quantities, and with such a violence, as to have formed a kind of promontory vulgarly called *Myfterios*, on the declivity of the coast, and at the distance of 1200 paces from the fountain. Such at least is the account of Ortelius; though we do not find this last circumstance of the promontory confirmed by later observations. The circumference of Pico is computed at about 15 leagues: and its most remarkable places are Pico, Lagoas, Santa Cruce or Cruz, San Sebastian, Pesquin, San Rocho, Playa, and Magdalena; the inhabitants of which live wholly on the produce of the island, in great plenty and felicity. The cattle are various, numerous, and excellent in their several kinds: it is the same with the vine; and its juice, prepared into different wines, the best in the Azores. Besides cedar and other timber, they have a kind of wood which they call *teixo*, solid and hard as iron; and vein-

ed, when finely polished, like a rich scarlet tabby; which colour it has in great perfection. The longer it is kept, the more beautiful it grows: hence it is, that the *teixo* tree is felled only for the king's use or by his order; and is prohibited from being exported as a common article of trade.

Pico Marina, a sea fish common at Kongo in Africa, derives its name from the resemblance of its mouth to the beak of a wood-pecker. It is of a large size, and prodigious strength, has four fins on its back, three under its belly, and one on each side of its head; its tail is large and forked, by which it cuts the waves with surprising force and velocity. It is at war with every fish that swims, and with every thing it meets in its way, without being intimidated by the largest vessels; a surprising instance of which intrepidity, we are told by some missionaries, whose ship was attacked by one of them, near these coasts, in the dead of night. The violence of the shock which it gave to the vessel quickly awakened the captain and the rest of the people; who immediately ran to the ship's side, where they perceived, by moon light, this huge monster fastened by its forehead to the vessel, and making the strongest efforts to disengage itself; upon which some of them tried to pierce him with their pikes, but he got off before they could accomplish their aim. On the next morning, upon visiting that side of the vessel, they found, about a foot below the surface of the water, a piece of its bony snout stuck fast into the wood, and two or three inches of it projecting outwards. They went presently after to visit the inside of the ship, and discovered about five or six inches more of the point of the horn which had penetrated through the plank.

PICQUERING, a flying war, or skirmish, made by soldiers detached from two armies for pillage, or before a main battle begins.

PICQUET, or PICKET. See PIQUET.

PICRAMNIA, in botany: A genus of the pentandria order, belonging to the diccia class of plants; and in the natural method ranking with those that are doubtful. The calyx is tripartite; the corolla has three petals; the stamina from three to five, awl-shaped, and seem to join together at the base; there are two styli, which are short and bent backwards; the berry is roundish, and contains two oblong seeds, and sometimes one seed only. There is only one species, viz. the antidesma, or murjoe bush. This shrub is frequent in copses and about the skirts of woods in Jamaica, rising about eight or nine feet from the ground. The leaves are of an oval form, pointed and placed in an alternate form along the branches; the flower spikes are long, pendulous, and slender; the florets small and white: the berries are numerous; at first red, then of a jet black colour; the pulp is soft, and of a purple complexion.—The whole plant is bitter, and especially the berry. The negroes make a decoction of them, and use it in weaknesses of the stomach and in venereal cases.

PICRANIA AMARA, or *Bitter Wood*, is a tall and beautiful timber tree, common in the woods of Jamaica. It is a new genus, belonging to the pentandria monogynia of Linnæus. The name is expressive of its sensible qualities.

Every part of this tree is intensely bitter; and even after the tree has been laid for floors many years, who-

Pico
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Picrania.

Mod. Univ.
History,
vol. xiii.
p. 46. &c.

Pieris
||
Pictet.

ever rubs or scrapes the wood, feels a great degree of bitterness in their mouth or throat. Cabinet-work made of this wood is very useful, as no insect will live near it.

This tree has a great affinity to the *Quassia Amara* of Linnæus; in lieu of which it is used as an antiseptic in putrid fevers. When used, less of it will do than of the *Quassia Amara* of Surinam. See QUASSIA.

PICRIS, Ox-TONGUE; a genus of the polygamia æqualis order, belonging to the syngenesia class of plants. There are four species, of which the only remarkable one is the echioides, or common ox-tongue, growing spontaneously in corn-fields in Britain. It has undivided leaves embracing the stem, with yellow blossoms, which sometimes close soon after noon, at other times remain open till nine at night. It is an agreeable pot herb while young. The juice is milky, but not too acrid.

PICRIUM, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking with those that are doubtful. The calyx is monophyllous and quinquefid; the corolla monopetalous, and its tube is short; the filaments are four in number, and hooded at the place of their insertion; the style long and thick; the stigma bilamellated; the capsule is round, bivalved, and contains a number of small seeds.—There are two species, viz. the *spicata* and *ramosa*; both natives of Guaiana. Both species are bitter, and employed in dyspepsy, and to promote the menses: they are also recommended in visceral obstructions.

PICTET (Benedict), born at Geneva, in 1655, of a distinguished family, prosecuted his studies with great success. After having travelled into Holland and England, he taught theology in his own country with an extraordinary reputation. The university of Leyden, after the death of Spanreina, solicited him to come and fill his place; but he thought that his own country had the best right to his services: and for that generosity he received its thanks by the mouth of the members of council. A languishing disorder, occasioned by too much fatigue, hastened his death; which happened on the 9th of June 1724, at the age of 69 years. This minister had much sweetness and affability in his manner. The poor found in him a comforter and a father. He published a great number of works in Latin and French, which are much esteemed in Protestant countries. The principal of these are, 1. A System of Christian Theology in Latin, 3 vols. in 4to; the best edition of which is that of 1721. 2. Christian Morality, printed at Geneva, 1710, 8 vols in 12mo. 3. The History of the 11th and 12th centuries; intended as a sequel to that of Sæuer, printed in 1713, 2 vols. in 4to. The Continuator is held in higher estimation than the first author. 4. Several Controversial Treatises. 5. A great number of tracts on morality and piety; among which we must distinguish "the Art of Living and dying well;" published at Geneva, 1705, in 12mo. 6. Some Letters. 7. Some Sermons, from 1697 to 1721; 4 vols. in 8vo. With a vast number of other books, the names of which it would be tedious to mention; but which, as Mr Sennebier says, "all show evident marks of piety and good sense."

PICTET (John-Louis), a counsellor of Geneva, born in 1739, was of the same family. He was member of the Council of Two Hundred; Counsellor of State and Syndic; and died in 1781. He applied himself to the study of astronomy, and made several voyages into France and England for his improvement. Few men were ever blessed with a clearer or more enlightened understanding. He has left in manuscript the "Journal of a Voyage which he made to Russia and Siberia in 1768 and 1769, in order to observe the transit of Venus over the sun's disk:" A work very interesting, from the lively descriptions which it gives both of men and of nature.

PICTLAND. See PENTLAND.

PICTS, the name of one of those nations who anciently possessed the north of Britain. It is generally believed that they were so called from their custom of painting their bodies; an opinion which Camden supports with great erudition. (See Gough's edition, Vol. I. p. xci. of the preface). It is certainly liable, however, to considerable objections; for as this custom prevailed among the other ancient inhabitants of Britain, who used the *glastum* of Pliny and the *vitrum* of Mela for the like purpose, it may be asked, Why the name of *Picti* was confined by the Romans to only one tribe, when it was equally applicable to many others? Why should they design them only by an epithet without ever annexing their proper name? Or why should they impose a new name on this people only, when they give their proper name to every other tribe which they have occasion to speak of? As these questions cannot be answered in any satisfactory manner, it is plain we must look for some other derivation of the name.

The Highlanders of Scotland, who speak the ancient language of Caledonia, express the name of this once famous nation by the term *Pictich*; a name familiar to the ears of the most illiterate, who could never have derived it from the Roman authors. The word *Pictich* means *plunderers* or *plunderers*. The appellation was probably imposed upon this people by their neighbours, or assumed by themselves, some time after the reign of Caracalla, when the unguarded state of the Roman province, on which this people bordered, gave them frequent opportunities of making incursions thither, and committing depredations. Accordingly this name seems to have been unknown till the end of the 3d century. Eumenius the panegyrist is the first Roman author who mentions this people under their new name of *Pictich*, or, with a Latin termination, *Picti*. When we say that this name may have been probably assumed for the reason just now mentioned, we must observe, that, in those days of violence, the character of a robber was attended with no disgrace. If he had the address to form his schemes well, and to execute them successfully, he was rather praised than blamed for his conduct; providing he made no encroachments on the property of his own tribe or any of its allies. We mean this as no peculiar stigma upon the Picts; for other nations of antiquity, in the like rude state, thought and acted as they did. See *Thucydides*, lib. 3. p. 3. and *Virg. Æn.* 7. 745 et 749.

Concerning the origin of the Picts, authors are much divided. Boethius derives them from the Agathyrsi,

Pictet
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Picts.

1
Name.

2
Origin.

Picts.

thyrsi, Pomponius Lætus from the Germans, Bede from the Scythians, Camden(A) and Father Innes from the ancient Britons, Stillingfleet from a people inhabiting the Cimbrica Chersonesus, and Keating and O'Flaherty, on the authority of the Psalter Cashel, derive them from the Thracians. But the most probable opinion is, that they were the descendants of the old Caledonians. Several reasons are urged in support of this opinion by Dr Macpherson; and the words of Eumenes, "Caledonum, aliorumque Pictorum, filvas," &c. plainly imply that the Picts and Caledonians were one and the same people.

As there has been much dispute about the origin of the Picts, so there has been likewise about their language. There are many reasons which make it plain that their tongue was the Gaelic or Celtic; and these reasons are a further confirmation of their having been of Caledonian extract. Through the east and north-east coasts of Scotland (which were possessed by the Picts) we meet with an innumerable list of names of places, rivers, mountains, &c. which are manifestly Gaelic.

3
Language.

From a very old register of the priory of St Andrew's (Dalrymple's Collections, p. 122.) it appears, that in the days of Hungus, the last Pictish king of that name, St Andrew's was called *Mukrofs*; and that the town now called *Queensferry* had the name of *Ardehinneachan*. Both these words are plain Gaelic. The first signifies "the heath or promontory of boars;" and the latter, "the height or peninsula of Kenneth." In the list of Pictish kings published by Father Innes, most of the names are obviously Gaelic, and in many instances the same with the names in the list of Scottish or Caledonian kings published by the same author. Had Innes understood any thing of this language, he would not have supposed with Camden that the Picts spoke the British tongue. It was unlucky that the two words on which they built their conjecture (*Strath* and *Aber*) are as common in the Gaelic as they could have been in the British, and at this day make a part of the names of places in countries to which the Pictish empire never extended. The names of *Strathfillan* and *Lochaber* may serve as instances.

The venerable Bede, as much a stranger to the Celtic as either of the antiquaries just now mentioned, is equally unhappy in the specimen which he gives of the Pictish language in the word *penuabel*, "the head of the wall." Allowing the commutation of the initial *p* into *c*, as in some other cases, this word has still the same meaning in Gaelic which Bede gives it in the Pictish. It is true, there might have been then, as well as now, a considerable difference between various dialects of the Celtic; and thus, perhaps, that pious author was led to discover five languages in Britain agreeably to the five books of Moses: A conceit from which the good man derived a great deal of harmless satisfaction.

4
Territory.

The Picts of the earliest ages, as appears from the joint testimony of all writers who have examined the

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subject, possessed only the east and north-east coast of Scotland. On one side, the ancient Drumalbin, or that ridge of mountains reaching from Lochlomond near Dumbarton to the frith of Taine, which separates the county of Sutherland from a part of Ross, was the boundary of the Pictish dominions. Accordingly we find in the life of Columba, that, in travelling to the palace of Brudius, king of the Picts, he travelled over Drumalbin, the *Dorsum Britanniae* of Adamnan. On the other side, the territory of the Picts was bounded by the Roman province. After Britain was relinquished by the emperor Honorius, they and the Saxons by turns were masters of those countries which lie between the frith of Edinburgh and the river Tweed. We learn from Bede, that the Saxons were masters of Galloway when he finished his Ecclesiastical History. The Picts, however, made a conquest of that country soon after; so that, before the extinction of their monarchy, all the territories bounded on the one side by the Forth and Clyde, and on the other by the Tweed and Solway, fell into their hands.

Picts.

5
History. The history of the Picts, as well as of all the other ancient inhabitants of Britain, is extremely dark. The Irish historians give us a long list of Pictish kings, who reigned over Pictavia for the space of eleven or thirteen centuries before the Christian era. After them Innes, in his Critical Essay, gives us a list of above fifty, of whom no less than five held the sceptre, each for a whole century. It is probable that these writers had confounded the history of the Picts with that of their ancestors the old Caledonians. In any other view, their accounts of them are highly fabulous; and have been long ago confuted by Dr Macpherson of Slate, an antiquary of much learning and research. The Picts, as has been already observed, were probably not known by that name before the 2d or 3d century. Adamnan, abbot of Iona, is the first author that expressly mentions any Pictish king; and the oldest after him is Bede. We are informed by these two writers, that St Columba converted Brudius king of the Picts to the Christian faith. Columba came into Britain in the year of the vulgar era 565. Before that period we have no general record to ascertain so much as the name of any Pictish king. The history of *Drust* or *Drest*, who is said to have reigned over the Picts in the beginning of the fifth century, when St Ninian first preached the gospel to that nation, has all the appearance of fiction(B). His having reigned a hundred years, and his putting an end to a hundred wars, are stories which exceed all the bounds of probability.

Brudius, the contemporary of Columba, is the first Pictish king mentioned by any writer of authority.

What figure his ancestors made, or who were his successors on the throne of Pictavia, cannot be ascertained. Bede informs us, that, during the reign of one of them, the Picts killed Egfred king of Northumberland in battle, and destroyed the greatest part of his

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(A) See Gough's edition of Camden, Vol. I. Preface, p. xc. and the *Ancient Universal History*, Vol. XVII. p. 39, &c.

(B) According to Camden, this conversion happened about the year 630, in the southern Pictish provinces; while the northern, which were separated by fruitful mountains, were converted by Columba.

Picts.

his army. The same author mentions another of their kings called *Naitan*, for whom he had a particular regard. It was to this *Naitan* that Ceolfrid, abbot of Wiremouth, wrote his famous letter concerning Easter and the Tonsure (c); a letter in which Bede himself is supposed to have had a principal hand. Roger Hoveden and Simon of Durham mention two other Pictish kings *Onnuft* and *Kinob*, the first of whom died in 761, and the latter flourished about the 774, and gave an asylum to Alfred of Northumberland, who was much about that time expelled his kingdom. The accounts given by the Scots historians of several other Pictish kings cannot be depended on; nor are the stories told by the British historians, Geoffroy of Monmouth and the author of the *Eulogium Britannie*, worthy of much greater credit.

In the ninth century the Pictish nation was totally subdued by the Scots in the reign of Kenneth Macalpin. Since that time their name has been lost in that of the conquerors, with whom they were incorporated after this conquest; however, they seem to have been treated by the Scottish kings with great lenity, so that for some ages after they commanded a great deal of respect. The prior of Hogulstead, an old English historian, relates, that they made a considerable figure in the army of David the Saint, in his disputes with Stephen king of England. In a battle fought in the year 1136, by the English on one side, and the Scots and Picts on the other, the latter insisted on their hereditary right of leading the van of the Scots army, and were indulged in that request by the king.

The principal seat of the Pictish kings was at Abernethy. Brudius, however, as appears from the accounts given by Adamnan, in his life of Columba, had a palace at Inverness, which was probably near the extremity of his territory in that quarter; for there is no good reason for believing, with Camden, that this king had any property in the Western Isles, or that he had made a gift of Iona to St Columba when he visited him in that place.

6
Manners.

With respect to the manners and customs of the Picts, there is no reason to suppose they were any other than those of the old Caledonians and Scots, of which many particulars are related in the Greek and Roman writers who have occasion to speak of those nations.

Upon the decline of the Roman empire, cohorts of barbarians were raised, and Picts were invited into the service, by Honorius, when peace was every where restored, and were named *Honoriaci*. Those under Constantine opened the passes of the Pyrenean mountains, and let the barbarous nations into Spain. From this period we date the civilization of their manners, which happened after they had by themselves, and then with the Scots, ravaged this Roman province.

Picts Wall, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England, to prevent the incursions of the Picts and Scots. It was first made only of turf strengthened with palisadoes, till the emperor Severus, coming into Britain in person, built it with solid stone. This wall, part of which still remains, begun at the entrance of the Solway Frith in Cumberland, and running north-east extended to the German Ocean. See ADRIAN and SEVERUS.

PICTURE, a piece of painting, or a subject represented in colours, on wood, canvas, paper, or the like. See PAINTING.

PICTURESQUE BEAUTY, says a late writer on that subject, refers to "such beautiful objects as are suited to the pencil." This epithet is chiefly applied to the works of nature, though it will often apply to works of art also. Those objects are most properly denominated picturesque which are disposed by the hand of nature with a mixture of *varied rudeness, simplicity, and grandeur*. A plain neat garden, with little variation in its plan; and no striking grandeur in its position, displays too much of art, design, and uniformity, to be called picturesque. "The ideas of *neat* and *smooth* (says Mr Gilpin), instead of being picturesque, in fact disqualify the object in which they reside from any pretensions to picturesque beauty. Nay, farther, we do not scruple to assert, that roughness forms the most essential point of difference between the beautiful and the picturesque; as it seems to be that particular quality which makes objects chiefly pleasing in painting. I use the general term *roughness*; but properly speaking roughness relates only to the surfaces of bodies: when we speak of their delineation, we use the word *ruggedness*. Both ideas, however, equally enter into the picturesque, and both are observable in the smaller as well as in the larger parts of nature; in the outline and bark of a tree, as in the rude summit and craggy sides of a mountain.

"Let us then examine our theory by an appeal to experience, and try how far these qualities enter into the idea of picturesque beauty, and how far they mark that difference among objects which is the ground of our inquiry.

"A piece of Palladian architecture may be elegant in the last degree; the proportion of its parts, the propriety of its ornaments, and the symmetry of the whole, may be highly pleasing; but if we introduce it in a picture, it immediately becomes a formal object, and ceases to please. Should we wish to give it picturesque beauty, we must use the mallet instead of the chissel; we must beat down one half of it, deface the other, and throw the mutilated members around in heaps; in short, from a smooth building we must turn it into a rough ruin. No painter who had the choice of the two objects would hesitate a moment.

"Again,

(c) We are told by some authors that Columba taught the Picts to celebrate Easter always on a Sunday between the 14th and 20th of March, and to observe a different method of tonsure from the Romans, leaving an imperfect appearance of a crown. This occasioned much dispute till Naitan brought his subjects at length to the Roman rule. In that age many of the Picts went on a pilgrimage to Rome, according to the custom of the times; and amongst the rest we find two persons mentioned in the antiquities of St Peter's church: *Asterius* count of the Picts, and *Syra* with his countrymen, performed their vow.

||
Picturesque
Beauty.

Picture
Beauty.

"Again, why does an elegant piece of garden-ground make no figure on canvas? the shape is pleasing, the combination of the objects harmonious, and the winding of the walk in the very line of beauty. All this is true; but the smoothness of the whole, though right and as it should be in nature, offends in picture. Turn the lawn into a piece of broken ground, plant rugged oaks instead of flowering shrubs, break the edges of the walk, give it the rudeness of a road, mark it with wheel-tracks, and scatter around a few stones and brushwood; in a word, instead of making the whole smooth, make it rough, and you make it also picturesque. All the other ingredients of beauty it already possessed." On the whole, picturesque composition consists in uniting in one whole, a variety of parts, and these parts can only be obtained from rough objects.

It is possible therefore to find picturesque objects among works of art, and it is possible to make objects so; but the grand scene of picturesque beauty is nature in all its original variety, and in all its irregular grandeur. "We seek it (says our author) among all the ingredients of landscape, trees, rocks, broken grounds, woods, rivers, lakes, plains, valleys, mountains, and distances. These objects in themselves produce infinite variety; no two rocks or trees are exactly the same; they are varied a second time by combination; and almost as much a third time by different lights and shades and other aerial effects. Sometimes we find among them the exhibition of a whole, but oftener we find only beautiful parts."

Sublimity or grandeur alone cannot make an object picturesque: for, as our author remarks, "however grand the mountain or the rock may be, it has no claim to this epithet, unless its form, its colour, or its accompaniments, have some degree of beauty. Nothing can be more sublime than the ocean; but wholly unaccompanied, it has little of the picturesque. When we talk therefore of a sublime object, we always understand that it is also beautiful; and we call it sublime or beautiful only as the ideas of sublimity or simple beauty prevail. But it is not only the form and the composition of the objects of landscape which the picturesque eye examines, it connects them with the atmosphere, and seeks for all those various effects which are produced from that vast and wonderful storehouse of nature. Nor is there in travelling a greater pleasure than when a scene of grandeur bursts unexpectedly upon the eye, accompanied with some accidental circumstance of the atmosphere which harmonizes with it, and gives it double value."

There are few places so barren as to afford no picturesque scene.

Believe the muse,
She does not know that inauspicious spot
Where beauty is thus niggard of her store.
Believe the muse, through this terrestrial waste
The seeds of grace are sown, profusely sown,
Even where we least may hope.—

Mr Gilpin mentions the great military road between Newcastle and Carlisle as the most barren tract of country in England; and yet there, he says, there is "always something to amuse the eye. The interchangeable patches of heath and green-sward make an

agreeable variety. Often too on these vast tracts of intersecting grounds we see beautiful lights, softening off along the sides of hills; and often we see them adorned with cattle, flocks of sheep, heath-cocks, grouse, plover, and flights of other wild-fowl. A group of cattle standing in the shade on the edge of a dark hill, and relieved by a lighter distance beyond them, will often make a complete picture without any other accompaniment. In many other situations also we find them wonderfully pleasing, and capable of making pictures amidst all the deficiencies of landscape. Even a winding road itself is an object of beauty; while the richness of the heath on each side, with the little hillocks and crumbling earth, give many an excellent lesson for a fore-ground. When we have no opportunity of examining the grand scenery of nature, we have every where at least the means of observing with what a multiplicity of parts, and yet with what general simplicity, she covers every surface.

"But if we let the imagination loose, even scenes like these administer great amusement. The imagination can plant hills; can form rivers and lakes in valleys; can build castles and abbeys; and if it find no other amusement, can dilate itself in vast ideas of space."

Mr Gilpin, after describing such objects as may be called picturesque, proceeds to consider their sources of amusement. We cannot follow our ingenious author through the whole of this consideration, and shall therefore finish our article with a short quotation from the beginning of it. "We might begin (says he) in moral style, and consider the objects of nature in a higher light than merely as amusement. We might observe, that a search after beauty should naturally lead the mind to the great origin of all beauty; to the

— first good, first perfect, and first fair.

But though in theory this seems a natural climax, we insist the less upon it, as in fact we have scarce ground to hope that every admirer of picturesque beauty is an admirer also of the beauty of virtue; and that every lover of nature reflects, that

Nature is but a name for an effect,
Whose cause is God.—

If, however, the admirer of nature can turn his amusements to a higher purpose; if its great scenes can inspire him with religious awe, or its tranquil scenes with that complacency of mind which is so nearly allied to benevolence, it is certainly the better. *Apponatus lucro*. It is so much into the bargain; for we dare not promise him more from picturesque travel than a rational and agreeable amusement. Yet even this may be of some use in an age teeming with licentious pleasure; and may in this light at least be considered as having a moral tendency."

PICUIPINIMA, in ornithology, is the name of a species of pigeon in Brasil. It is so very small as scarce to exceed the lark in size. Its head, neck, and wings, are of a pale lead colour, with a black semilunar mark at the extremity of each wing; but its long wing-feathers, which are seen when the wings are expanded in flying, are of a reddish-brown on one side, and blackish on the other, with black ends or tips; the tail is long,

Picture
Beauty.
Picuipini-
ma.

Picumnus, long, and is variegated with black, white, and brown; the belly is covered with white feathers, every one of which has a brown mark of the shape of a half moon at the end.

PICUMNUS and **PILUMNUS**, were two deities at Rome, who presided over the auspices required before the celebration of nuptials. **Pilumnus** was supposed to patronize children, as his name seems in some manner to indicate *quod pellat mala infantie*. The manuring of land was first invented by **Picumnus**, from which reason he is called *Sterquilinus*. **Pilumnus** is also invoked as the god of bakers and millers, as he is said to have first invented the art of grinding corn.

PICUS, the **WOODPECKER**, in ornithology, a genus belonging to the order of *picæ*. The beak is straight, and consists of many fides, and like a wedge at the point; the nostrils are covered with bristly feathers; the tongue is round like a worm, very long, and sharp at the point, which is beset with bristles bent backwards.

The grand characteristic, says **Latham**, of these birds is the tongue (which in no bird is similar, the wryneck excepted, whose other characters, however, differ too widely to give it place in this class), the muscles necessary to the motions of which are singular and worthy of notice; affording the animal means of darting it forwards the whole length, or drawing it within the mouth at will. See *Ray on the Creation*, p. 143. *Derham's Physic. Theol.* p. 342. Note c. *Will. Orn.* p. 136. t. 21.

The same intelligent ornithologist enumerates no less than 50 different species of woodpeckers, besides varieties of some of them which amount to nine more. Each of these species our readers cannot expect us to describe; we shall therefore content ourselves with such as appear to be most remarkable.

1. The *picus martius*, or greatest black woodpecker, is about the size of a jackdaw, being about 17 inches long; the bill is nearly two inches and a half in length, of a dark ash-colour, and whitish on the sides; the irides are pale yellow, and the eyelids are naked, according to **Scopoli**; the whole bird is black, except the crown of the head, which is vermilion; the first quill-feather is the shortest, and the two middle tail-feathers, which are longer than the others, make it appear a little rounded; the legs are of a lead colour, covered with feathers on the fore part for half their length.

*Latham's
Synopsis,
vol. ii.
p. 55.*

"The female differs from the male in having the hind head only red, and not the whole crown of the head; and the general colour of the plumage has a strong cast of brown in it. It has likewise been observed, that the red on the hind head has been wholly wanting; and indeed both male and female are apt much to vary in different subjects; some having a much greater proportion of red on the head than others. This species is found on the continent of Europe, but not in plenty except in Germany. It is not an inhabitant of Italy, and is very rarely seen in France. **Frisch** mentions it as a bird common to his parts; and it is found also in Sweden, Switzerland, and Denmark, but not in winter.

"It is said to build in old ash and poplar trees, making large and deep nests; and **Frisch** observes, that they often so excavate a tree, that it is soon after blown

down with the wind; and that under the hole of this bird may often be found a bushel of dust and bits of wood. The female lays two or three white eggs, the colour of which, as **Willoughby** observes, is peculiar to the whole of the woodpecker genus, or at least all those which have come under his inspection."

2. The *picus principalis*, or white-billed woodpecker, is somewhat bigger than the last, being equal in size to a crow. It is 16 inches long, and weighs about 20 ounces. The bill is white as ivory, three inches long, and channelled; the irides are yellow, and on the hind head is an erect pointed crest, of a fine red colour, some of the feathers of which are two inches long; the head itself, and the body in general, are black; but the lower part of the back, rump, and upper tail-coverts, are white; from the eye there arises a stripe of white, which passes on each side of the neck down to the back; three or four of the prime quills are black, but the rest are white; the tail is cuneiform, and of the same colour as the body; the legs and claws are also black.

"This species inhabits Carolina, Virginia, New Spain, and Brasil, and is called by the Spaniards *carpenter*, and not without reason, as this as well as most of the other species make a great noise with the bill against the trees in the woods, where they may be heard at a great distance, as if carpenters were at work, making, according to **Catesby**, in an hour or two a bushel of chips. He adds likewise, that the Canadian Indians make use of the bills of these birds for coronets, setting them round in a wreath with the points outwards; and that the northern Indians purchase them of the southern at the rate of two and three buckskins per bill. **Kalm** says they are found in New Jersey, though very seldom, and only at certain seasons."

3. The *picus erythrocephalus*, or red-headed woodpecker, is about eight inches three quarters long, and weighs two ounces. The bill is an inch and a quarter in length, of a lead colour, with a black tip; the irides are dusky; the head and the neck are of a most beautiful crimson; the back and wings are black; the rump, breast, and belly, are white; the ten first quills are black, the eleventh black and white, and the others are white with black shafts; the tail is black and cuneiform; the legs and claws are of lead colour. The cock and hen are very nearly alike.

"This species inhabits Virginia, Carolina, Canada, and most of the parts of North America; but at the approach of winter it migrates more or less to the southward, according to the severity of the season; and upon this circumstance the people of North America foretel the rigour or clemency of the ensuing winter. **Kalm** observes that it is a very common bird, and is very destructive to the maize-fields and orchards, pecking through the ears of maize, and destroying great quantities of apples. In some years they are more numerous than in others, when they attack the orchards where the sweet apples grow, which they eat so far that nothing remains but the mere pills. Some years since there was a premium of twopence per head paid from the public fund, in order to extirpate this pernicious bird; but this has been neglected much of late. They are said likewise to be very fond of acorns. In Virginia and Carolina they stay the whole year, but are

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are not seen in such numbers in winter as in summer. During the winter they are very tame, and are frequently known to come into the houses in the same manner as the redbreast is wont to do in England. It is observed that this species is found chiefly in old trees; and the noise they make with their bills may be heard above a mile distant. It builds the earliest of all the woodpeckers; and generally pretty high from the ground. It is accounted by many people very good eating. Buffon is of opinion, that it is necessity alone that causes these birds to feed on vegetables of any kind, as it is contrary to the nature of the genus."

4. The *picus pubescens*, or little woodpecker, according to Catesby, weighs only about an ounce and an half. Brisson says, it is larger than the smallest of our European species, being about five inches and a half long. The bill is about eight lines long, and of a horn colour; the top of the head is black, and on each side above the eye is a white line; the hind head is red; the hind part of the neck, the back, and rump, are black, which is divided into two parts by a line of white passing down the middle to the rump; the scapulars, upper wing and tail coverts, are black; the greater wing coverts and quills are spotted with white; the under parts of the body are pale grey; the tail is black; the four middle feathers are plain, the rest are barred with white and black; and the legs and claws are black.

The female has no red on the hind head. Linnæus tells us, that the outer tail feather is white, marked with four black spots. This species inhabits Virginia and Carolina. According to Kalm, it abounds in New Jersey, where it is esteemed of all others the most dangerous to orchards, and is the most daring. As soon as it has pecked one hole in a tree, it makes another close to the first, in an horizontal direction, proceeding till it has made a circle of holes quite round the tree; and the apple-trees in the orchards have often several of these rings of holes round the stem, in so much that the tree frequently dries up and decays.

5. The yellow woodpecker is about nine inches long. The bill is of a yellowish white, and more than an inch long; the hind head is crested; the head itself, the neck, and whole body, are covered with dirty white feathers; from the lower jaw to the ears, on each side, there is a red stripe; the wing coverts are brown and edged with yellowish, and some of the greater ones are mixed with rufous on the inner web; the quills are brown or rufous; the tail is black; the legs and claws are grey.

"This species is common at Cayenne, and is called there *charpentier jaune*. It makes its nest in old trees which are rotten within; making with its bill a hole from without, at first horizontal, but declining down-

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wards as soon as it has pierced through the sound part, till it is at last a foot and a half below the first opening. The female lays three white and nearly round eggs, and the young are hatched about the beginning of April. The male bears his share in the work with the female, and in her absence keeps sentinel at the entrance of the hole. The note of this bird is a kind of whistle six times repeated, of which the two or three last are in a graver accent than the others. The female wants the red band on the side of the head which is seen in the male.

"Specimens vary; some are of that dirty white, as Brisson describes it, others of a light yellow; which last is the case in a specimen in the Leverian museum: this is 13 inches in length.

"In the place referred to above, we find a bird imperfectly described by Mr Fermin: he merely says, that it is a large species; that it has a fine red crest on the head; the neck, breast, and belly, of a citron colour; and the wings blueish above. He only adds, that it may be distinguished from others by the strokes of the bill, which it gives to the trees, and may be heard at a great distance."

6. The *picus auratus*, or gold-winged woodpecker, is about 11 inches long, and weighs about 5 ounces. The bill is an inch and a half long, and is somewhat bent, and is not square but roundish, ridged only on the top, the point being sharp; the upper parts of the head and neck are ash coloured; the hind head is red; the sides of the head, throat, and fore-part of the neck, are pale yellow; on each side of the head is a stripe of black, from the base of the lower jaw to the neck; the back, scapulars, and wing coverts, are of a grey brown colour, transversely striated with black lines; the rump is whitish; the breast, belly, and sides, are whitish yellow, and each feather is marked with a round black spot at the tip; on the middle of the breast there is a large crescent of black; the thighs, upper and under tail coverts, are black and white mixed; the quills are brown, with yellow shafts spotted with brown on the outer edge; the tail is blackish, being outwardly edged with grey; the outer feather is dotted with whitish on the margins; the shafts of all but the two middle feathers are yellow half way from the base; and the legs and claws are brown.

The female differs in having the crown and neck behind grey brown; the hind head of a less vivid red; and the greater quills not spotted on the edges. She also wants the black list on the throat, but otherwise like the male.

This species inhabits Virginia, Carolina, and Canada, and is plenty in New Jersey and about New York, where it is called by some *bittock* or *pint*, and by others *high-hole* (A). Both the first names have some relation to its

(A) "I have lately seen (says Latham) in the Leverian museum a bird which appears to be a mere variety, though brought from a far different country. This was much like the *picus auratus* in colour, but rather less in size. The bill exactly made like that bird, and brown; on each side of the jaw is a stripe of crimson like a whisker; the under part of the wings of a pale red colour, not unlike what is called *red lead*: and the shafts of the quills and tail, which in the other bird are yellow, in this are red; the plumage on the upper parts of the body is brown, beneath vinaceous, marked with round black spots; tail black, pointed, and each feather bifurcated at the tip, exactly like the American one. This was brought from the Cape of Good Hope. I have seen two specimens of this bird."

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its note; and perhaps the latter, from the situation of the nest. It is almost continually on the ground, and is not observed to climb on the trees, like others of the genus. It lives chiefly on insects (s), and is commonly very fat, so as to be thought very palatable for the table. It stays all the year; and as it cannot at all times get insects, it must perhaps eat some kind of grass or plants in the fields. Its form and some of its qualities make it resemble the cuckoo (c). Though it climbs not on trees, it flies to their tops and sits occasionally on the branches.

Forster, in the Philosophical Transactions, observes, that it is a bird of passage in the northern parts of America, visiting the neighbourhood of Albany Fort in April, and leaving it in September; that it lays from four to six eggs, in hollow trees, and feeds on worms and other insects. Called by the natives *ou-thee-quan-now*.

The following species are pretty well known in Britain.

7. The *viridis*, or green woodpecker, weighs six ounces and a half; its length is 13 inches, the breadth 20 and a half; the bill is dusky, triangular, and near two inches long; the crown of the head is crimson, spotted with black; the eyes are surrounded with black, and the males have a rich crimson mark beneath the blackness; the back, neck, and lesser coverts of the wings, are green; the rump of a pale yellow; the whole of the under part of the body is of a very pale green, and the thighs and vent are marked with dusky lines; the legs and feet are of a cinereous green; the tail consists of ten stiff feathers, whose ends are generally broken, as the bird rests on them in climbing; their tips are black; the rest of each is alternately barred with dusky and deep green. These birds feed entirely on insects; and their principal action is that of climbing up and down the bodies or boughs of trees: for the first purpose they are provided with a long slender tongue, armed with a sharp bony end barbed on each side, which by the means of a curious apparatus of muscles they can exert at pleasure, darting it to a great length into the clefts of the bark, transfixing and drawing out the insects that lurk there. They make their nests in the hollows of trees: in order therefore to force their way to those cavities, their bills are formed strong, very hard, and wedge-like at the end; Dr Derham observes, that a neat ridge runs along the top, as if an artist had designed it for strength and beauty. Yet it has not power to penetrate a sound tree; their perforation of any tree is a warning to the owner to throw it down. Their legs are short, but

strong; their thighs very muscular; their toes disposed two backward, two forward; the feathers of the tail are very stiff, sharp-pointed, and bending downwards. The three first circumstances do admirably concur to enable them to run up and down the sides of trees with great security; and the strength of the tail supports them firmly when they continue long in one place, either where they find plenty of food, or while they are forming an access to the interior part of the timber. This form of the tail makes their flight very awkward, as it inclines their body down, and forces them to fly with short and frequent jerks when they would ascend, or even keep in a line. This species feeds oftener on the ground than any other of the genus: all of them make their nests in the hollows of trees; and lay five or six eggs, of a beautiful semitransparent white.

Willoughby says that the female lays five or six eggs; which Pennant (D) also observes; adding, that they are of a beautiful semitransparent white.

"These birds sometimes build in a hollow asp or other tree, 15 or 20 feet from the ground. The male and female take it by turns to bore through the living part of the wood, till they come to the rotten part, wherein, after being hollowed out to a proper depth, they lay their eggs (E), which are generally five and sometimes six (F) in number, greenish, with small black spots. The young ones climb up and down the trees before they can fly. It is worthy of remark to observe with what nicety the holes of the woodpecker are made, as perfectly round as if made by the assistance of a pair of compasses. Nuthatches, starlings, and bats, frequently build in these holes when deserted.

"Both Frisch and Klein mistake in saying that the females have not the red crown, for even the young ones in the nest have the appearance of it; and I have had them brought to me when they could scarcely fly, when the red was mixed with brown; but they do not become of a full red till after the first moult. They are said to be fond of bees in winter, making great havock among them. Salerne observes, that they are found in the markets in Italy, at Bologna; but this is not extraordinary, for the Italians eat all small birds almost without exception.

"In Sir A. Lever's museum there is a variety of this bird, of a straw-colour throughout, except the crown, which is faintly marked with red."

8. The major, or great spotted woodpecker, weighs two ounces three quarters; the length is nine inches; the breadth is 16. The bill is one and a quarter long, of a black horn colour. The irides are red. The forehead

(B) "In defect of insects I have been informed (says Mr Latham), that it feeds on the berries of the red cedar, and grows fat on them. This food has been both disgorged by the mouth, after being shot, as well as found in the stomach on dissection."

(C) "Linnaeus, in his tenth edition of the *Systema Naturae*, had ranked this with the cuckoos; and Buffon, from its similarity to this genus, has placed it at the end of the woodpeckers of its class."

(D) *Br Zool* p. 242. where some pertinent observations on these birds may be found. Let the reader also consult Ray on the Creation, p. 143. and Derham's *Physico-theol* p. 193, 339, 342.

(E) "This is sometimes so deep that they must feed their young quite in the dark; for I have been told by one, that he was obliged to thrust his whole arm to the shoulder down the hollow of a tree before he could reach the eggs."

(F) "I have seen six young ones together in one nest." *Will. Orn.* p. 136.

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head is of a pale buff colour; the crown of the head a glossy black; the hind-part marked with a rich deep crimson spot. The cheeks are white; bounded beneath by a black line that passes from the corner of the mouth and surrounds the hind-part of the head. The neck is encircled with a black colour. The throat and breast are of a yellowish white; the vent feathers of a fine light crimson. The back, rump, and coverts of the tail, and lesser coverts of the wings, are black; the scapular feathers and coverts adjoining to them are white. The quill-feathers are black, elegantly marked on each web with round white spots. The four middle feathers of the tail are black, the next tipped with dirty yellow; the bottoms of the two outermost black; the upper parts a dirty white. The exterior feathers marked on each web with two black spots; the next with two on the inner web, and only one on the other. The legs are of a lead colour. The female wants that beautiful crimson spot on the head; in other respects the colours of both agree. This species is much more uncommon than the preceding; and keeps altogether in the woods. This bird is pretty common in England, France, Germany, and other parts of Europe, frequenting the woods like the rest of its genus, and is likewise met with in America. It is a very cunning bird; for when a person has seen one on a tree, he is almost sure to lose sight of it, if the tree is large, and the observer not very attentive; for the moment it spies any one it will creep behind a branch, and there lie secure till the danger is over. The extreme facility with which birds of the woodpecker kind descend as well as ascend the trees is worthy admiration, seeming to do both with equal ease to itself. We do not find any one who has noticed the colour of the eggs; but Buffon mentions having found a nest with six young ones in an old decayed asp tree, 30 feet from the ground.

9. The medius, or middle-sized woodpecker, agrees with the preceding in colours and size, excepting that the crown of the head in this is of a rich crimson; the crown of the head in the male of the former black; and the crimson is in form of a bar on the hind part. Birds thus marked have been shot in Lancashire and other parts of England; but Mr Pennant is doubtful whether they are varieties, or distinct species. "Brisson (says Latham), quotes many authors who have described this bird, but I am not clear in its being a distinct species. It is certainly much more scarce in England than any other. Buffon is reconciled to its being a variety only; but if so, this variety is regular, at least, in all the specimens which I have seen."

10. The minor, or least spotted woodpecker, scarce weighs an ounce: the length is six inches; the breadth eleven. The forehead is of a dirty white: the crown of the head (in the male) of a beautiful crimson: the cheeks and sides of the neck are white, bounded by a bed of black beneath the former. The hind part of the head and neck, and the coverts of the wings, are black: the back is barred with black and white: the scapulars and quill-feathers spotted with black and white: the four middle feathers of the tail are black; the others varied with black and white: the breast and belly are of a dirty white: the crown of the head (in the female) is white; the feet are of a lead colour. It has all the characters and actions of the greater kind,

but is not so often met with. Salerne tells us that this bird is not found in France; but Buffon affirms that it inhabits most of the provinces there. It approaches near habitations in winter, and may be seen in orchards adjoining to houses, which no doubt it does for the sake of food, finding about the trunks of the trees both caterpillars and larvæ of insects of all kinds. It builds in an hole of a tree, and often disputes the right of possession with the little colemouse, which last, as it is much weaker of the two, must yield the victory. Willoughby says it is called in England by the name of *bickwall*. Linnæus, in his synonymes of this bird, quotes Hasselquist for the same; but whoever will diligently read what this author says of the matter, will be convinced that the reference should be to the greater rather than the least of this genus. It is said by him to inhabit the higher parts of Asia.

Mr Sonnerat mentions a bird found by him at Antigue, in the island of Panay, with the top of the head, and hind part of the neck, of a greyish black: on each side of the neck, two-thirds downwards, is a stripe of white, which begins just above the eye; and under this another of black from the eye to the shoulder. The upper part of the body is black and white. The under parts pale yellow, spotted with black. The tail is black above, and beneath barred with a dirty white and yellowish colour. The bill and legs blackish. The head had no red on it. Buffon supposes it to have been a female, and a variety only of our least spotted woodpecker.

Picus (fab. hist.), a king of Latium, son of Saturn. He married Venilia, also called Canens, by whom he had Faunus. He was tenderly loved by the goddess Pomona, and he returned her affection. As he was one day hunting in the woods, he was met by Circe, who became deeply enamoured of him, and who changed him into a woodpecker, called by the name of *picus* among the Latins. His wife Venilia was so disconsolate when she was informed of his death, that she pined away. Some suppose that Picus was the son of Pilumnus, and that he gave out prophecies to his subjects by means of a favourite woodpecker; from which circumstance originated the fable of his being metamorphosed into a bird.

Picus (John), earl of Mirandola, a prodigy of parts and learning, was the youngest child of John Francis Picus earl of Mirandola and Concordia; and was born in the year 1463. The progress that he made in letters was so extremely rapid, that it was matter of astonishment to see even a boy one of the first poets and orators of his age. He was the scholar of R. Jochanan, a German Jew, who confirmed his natural fondness for the cabalistical writings, insomuch that he is reported to have declared, that those who dived into them dived in the true head spring; whereas those rivulets that had flowed thence into Greece were no better than corrupt and stagnated waters. After visiting the most famous universities of France and Italy, he went to Rome; where, in 1486, before he was 24 years of age, he published 900 propositions in logic, mathematics, physics, divinity, cabalistic learning, and magic, drawn not only from Greek and Latin, but even from Jewish and Arabian writers: subjoining to his advertisement, that, "if any philosopher or divine would come to Rome to dispute with him."

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him upon any or all of them, he would defray the expences of his journey from the remotest corners of Italy." He enjoyed, however, the honour of this disputatious challenge quietly, without danger to his credit: for envy procured some of his propositions to be charged with heresy, and he was forbid to dispute upon them. As a proof of the ignorance of his opposers, we are told that a theologian who had shown himself very zealous in censuring his book, being asked what was the meaning of the word *cabbala*? answered, that he was a wicked man and a heretic, who had written against Jesus Christ, and that those who followed his opinion were called cabbalists. At the age of 28, he confined himself wholly to the study of the scriptures; and undertook to combat the Jews and Mahometans, as well as to confound judicial astrology; but in this intention his credit was also saved, though with the loss of his life, by his dying in 1494, in his 32d year. He was called the *phoenix of his age*, and by Scaliger *Monstrum sine Vitio*. He composed a great number of works, which have often been printed both separately and together. The following epitaph is upon his tomb:

*Hic situs est Picus Mirandola, cetera norunt
Et Tagus et Ganges, forsan et Antipodes.*

PICUS (John Francis), prince of Mirandola, nephew of John Picus mentioned above, was born about the year 1469. He cultivated learning and the sciences after the example of his uncle; but he had a principality and dominions to superintend, which involved him in great troubles, and at last cost him his life. He was twice driven from his principality, and twice restored; and at last, in 1533, was, together with his eldest son Albert, assassinated in his own castle by his nephew Galeoti. He was a great lover of letters; and such of his works as were then composed were inserted in the Strasburgh edition of his uncle's in 1504, and continued in future impressions, besides some others which were never collected.

PIECE, in matters of money, signifies sometimes the same thing with species; and sometimes, by adding the value of the pieces, it is used to express such as have no other particular name. For the piece of eight, or piastre, see *MONEY-Table*.

PIECE, is also a kind of money of account, or rather a manner of accounting used among the negroes on the coast of Angola in Africa, See *MONEY-Table*.

PIECE, in heraldry, denotes an ordinary or charge. The honourable pieces of the shield are the chief, fess, bend, pale, bar, cross, saltier, chevron, and in general all those which may take up one-third of the field, when alone, and in what manner soever it be. See *HERALDRY*.

PIECES, in the military art, include all sorts of great guns and mortars. Battering pieces are the larger sort of guns used at sieges for making the breaches; such are the 24 pounder and culverine, the one carrying a 24 and the other an 18 pound ball. Field-pieces are 12-pounders, demiculverines, 6-pounders, sackers, minions, and 3-pounders, which march with the army, and encamp always behind the second line, but in day of battle are in the front. A soldier's firelock is likewise called his *piece*.

PIEDMONT, a country of Italy, with the title Piedmont of a principality, is bounded on the north by Savoy and Italy; on the west by France; on the south by the Mediterranean and the republic of Fenoa; and on the east by the duchies of Montferrat and Milan; extending about 150 miles from north to south, but much less from east to west. It is called Piedmont, and in Latin *Piedmontium*, from its situation at the foot of the mountains, or Alps, which separate France from Italy. This country is in some parts mountainous, but is everywhere very fruitful. The plains produce fine corn, and Montferrat and the Milanese yield great quantities of Turkey wheat, which commonly serves for bread, and with which the people of the middle rank mix rye; the pods are used for fuel, and the stalks being thick serve to mend the roads. The hills produce plenty of wine, which, like the Italian wines, is very luscious when new, especially the white. There is also a tartish red wine called *vino brusco*, said to be very wholesome for fat people, and, on the other hand, the sweet wine is recommended as a stomachic. The neighbourhood of Turin is famous for its fine fruits, and many long walks of chefnut and mulberry trees, which produce both pleasure and profit. Marons, or large chefnuts, are a favourite dainty among the common people. These are put into an oven, and, when thoroughly hot, and cooled in red wine, are dried a second time in the oven, and afterwards eaten cold. Truffles grow here in such abundance, that Piedmont has obtained the name of the *truffle country*. Some are black, others white marbled with red. Their price is rated according to their size. Sometimes they are found of 12 or 14 pounds weight; and many country people earn from 60 to 70 dollars a-year merely by digging for them. The trade in cattle is said to bring into Piedmont no less than three millions of livres per annum. The cultivation of silk is also a profitable article, the Piedmontese silk being, on account of its fineness and strength, esteemed the best in Italy. The Piedmontese gentry breed vast numbers of silk-worms under the care of their tenants, who have the eggs and mulberry leaves delivered to them, and in return they give half the silk to their masters. This principality comprehends eleven small provinces: Piedmont proper, the valleys between France and Italy, the valley of Saluza, the county of Nice, the marquisate of Susa, the duchy of Aost, the Canavese, the lordship of Vercelli, the county of Ast, and the Langes. It was formerly a part of Lombardy, but now belongs to the king of Sardinia, and lies at the foot of the Alps, which separate France from Italy. It contains many high mountains, among which there are rich and fruitful valleys, as pleasant and populous as any part of Italy. In the mountains are mines of several kinds, and the forests afford a great deal of curious game, among which the *tumor* is an useful animal. "The mules (says Mr Watkins) are very fine in this country; but the inhabitants have other beasts, or rather monsters, which they find very serviceable, though vicious and obstinate. These are produced by a cow and an ass, or mare and bull, and called *jumarres* or *gimmerri* (A). I cannot say that I have ever seen any of them, but I am told they are very common."

The

(A) These equivocal animals, however, if we may so term them, are so generally mentioned by travellers in this

Piedmont. The Piedmontese have more sense than the Savoyards, but then they are not so sincere. Some authors represent them as lively, artful, and witty, the inhabitants of the mountain of Aosta excepted, who are farther distinguished by large wens, as even their horses, dogs, and other animals. Mr Baretti, however, in his *Account of Italy*, vol. ii. p. 116. gives the following account of them. "One of the chief qualities (says he), which distinguish the Piedmontese from all other Italians, is their want of cheerfulness. Piedmont never produced a single good poet, as far as the records of the country can go, whereas there is no other province of Italy but what can boast of some poet ancient or modern; and yet the Piedmontese are not deficient in several branches of learning, and some of them have succeeded tolerably well in civil law, physic, and the mathematics. It is likewise observed of this people, that none of them ever attained to any degree of excellence in the polite arts, and it is but lately that they can boast of a painter, Cavaliero Bamente; a statuary, Signor Lodetto; and some architects, Conte Alfieri, Signor Borra, and others, who yet, to say the truth, are far inferior to numberless artists produced by the other provinces of Italy. They have, on the other hand, greatly advanced when considered as soldiers; though their troops have never been very numerous, every body conversant in history knows the brave stand they made for some centuries past against the French, Spaniards, and Germans, whenever they have been invaded by these nations. The skill of the Piedmontese in fortification is likewise very great, and their Bertolas and Pintos have shown as much genius as the Vaubans and Cohorns, in rendering impregnable several places which inferior engineers would only have made secure."

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The chief trade of this principality consists in hemp and silk. Indeed, so great is their trade in raw silk, that the English alone have purchased to the value of 200,000 lb. in a year. The silk worm thrives so well, that many peasants make above (B) 100 lb. of silk annually; and it is not only abundant, but universally known to be stronger and finer than any in Italy. The land owners divide the profit with their tenants. The Piedmontese workmen, however, are said to want expertness, though they finish their work equally well with those of other nations. The high duty and land-carriage on mules likewise tend to lessen the value of this trade. They have besides corn, rice, wine, fruits, flax, and cattle.

In the valleys of Lucerne, Peyrouse, and St Martin, which have always belonged to Piedmont, live the celebrated Waldenses or Vaudois, a name which signifies *people of the valleys*. These have rendered themselves famous in history for their dissent from the Romish church long before the time of Luther and Calvin, and for the persecutions they have suffered on that account; but since the year 1730 they have not been openly molested.

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lest for their religion, but, in order to suppress them by degrees, a popish church has been built in every parish. They are heavily taxed, and labour under great oppressions. The number of people in these valleys scarce at present exceeds 10,000, of which 1000 are Catholics. The chief river of Piedmont is the Po, which flows out of Mount Viso. The river Sesia, the Doria, Baltea, the ancient Druria, the Tenaro, and several others, run into it. The Var, anciently called the Varus, rises in the county of Nice, and after watering it empties itself into the Mediterranean. The language of the Piedmontese is a mixture of French and Italian. In this country are about 50 earldoms, 15 marquisates, a multitude of lordships, and 20 abbeyes. Though the country be entirely popish, except some valleys inhabited by the Waldenses, the king reserves to himself the greatest part of the power in church affairs, which in many other places is given up to the pope, and the constitution *unigenitus* is here universally opposed. Towards the end of the last century, the French king persuaded the duke of Savoy to drive them out of the country; in consequence of which 200,000 of them retired to Germany, England, and Holland, and yet they are not all extirpated, though, as we have observed, they are obliged to have a Roman Catholic church in every parish.

Pienes,
Piepoudre.

Turin, the general residence of the king of Sardinia, to whom this principality belongs, is the chief city. See TURIN. The number of inhabitants, Mr Watkins says, in Piedmont and Savoy, amount to 2,695,727 souls, of which Turin contains about 77,000.

PIENES, a small island of Japan, over against the harbour of Saccai, is famed not only for the beauty of its walks, to which crowds of people resort from the city, but for a deity worshipped there, to which vast numbers of persons devote themselves. They go from his temple to the sea side, where they enter into a boat provided for the purpose; then, launching into the deep, they throw themselves overboard, loaded with stones, and sink to the bottom. The temple of that deity, which is called Canon, is very large and lofty, and so are many others in the city itself; one in particular, dedicated to the gods of other countries, is thought the finest in the whole empire.

PIEPOUDRE (*Court of*), the lowest, and at the same time the most expeditious, court of justice known to the law of England. It is called PIEPOUDRE, (*curia pedis pulverizati*), from the dusty feet of the suitors; or, according to Sir Edward Coke, because justice is there done as speedily as dust can fall from the foot: Upon the same principle that justice among the Jews was administered in the gate of the city, that the proceedings might be the more speedy, as well as public. But the etymology given us by a learned modern writer is much more ingenious and satisfactory; it being derived, according to him, from *ped* puldreaux,

5 A

this part of Europe, that we have no doubt of their existence, nor of their being found hardy and serviceable as labourers.

(B) Each pound is valued in Piedmont at 18 s. The little village of La Tour, in the valley of Lucerne, makes above 50,000 lb. annually, and the exports every year to the single city of Lyons amount to more than 160,000 l. Sterling.

Pier
||
Pierino.

puldreaux, "a pedlar," in old French, and therefore signifying the court of such petty chapmen as resort to fairs or markets. It is a court of record, incident to every fair and market; of which the steward of him who owns or has the toll of the market is the judge. It was instituted to administer justice for all commercial injuries done in that very fair or market, and not in any preceding one. So that the injury must be done, complained of, heard, and determined, within the compass of one and the same day, unless the fair continues longer. The court hath cognizance of all matters of contract that can possibly arise within the precinct of that fair or market; and the plaintiff must make oath that the cause of an action arose there. From this court a writ of error lies, in the nature of an appeal, to the courts at Westminster. The reason of its institution seems to have been, to do justice expeditiously among the variety of persons that resort from distant places to a fair or market; since it is probable, that no other inferior court might be able to serve its process, or execute its judgments, on both or perhaps either of the parties; and therefore, unless this court had been erected, the complaint must necessarily have resorted even in the first instance to some superior judicature.

PIER, in building, denotes a mass of stone, &c. opposed by way of fortress to the force of the sea, or a great river, for the security of ships that lie at harbour in any haven.

PIERS of a Bridge. See BRIDGE.

PIERCEA. See RIVINIA.

PIERIA (anc. geog.), a district of Macedonia, contained between the mouths of the rivers Ludias and Peneus; extended by Strabo beyond the Ludias, to the river Axios on the north, and on the south no farther than the Aliacmon, along the west side of the Sinus Thermaicus.—Another *Pieria* of Syria, the north part of Seleucia, or the *Antiochena*, situated on the Sinus Issicus, and lying next Cilicia to the north-west.

PIERIDES, in fabulous history, the daughters of Pierus a Macedonian prince, presuming to dispute with the muses for the prize of poetry, were turned into magpies. The name of *Pierides* was also given to the muses, from mount Pieris in Thessaly, which was consecrated to them; or, according to others, from Pierus, a Thessalian poet, who was the first who sacrificed to them. See PIERIS.

PIERINO DEL VAGA, an eminent Italian painter, born of poor parents in Tuscany, about the year 1500. He was placed apprentice with a grocer in Florence, and got some instructions from the painters to whom he was sent with colours and pencils; but a painter named *Vaga* taking him to Rome, he was called *Del Vaga*, from living with him, his real name being *Buonacorsi*. He studied anatomy with the sciences necessary for his profession; and had somewhat of every thing that was good in his compositions. After Raphael's death, he joined with Julio Romano and Francisco Penni to finish the works in the Vatican which were left imperfect by their common master; and to confirm their friendship married Penni's sister. He gained the highest reputation by his performances in the palace of prince Doria at Genoa: but the multiplicity of his business, and the vivacity of his imagination, drained his spirits in the flower of his age; for he

died in the year 1547. Of all Raphael's disciples, Pierino kept the character of his master longest, i. e. his exterior character and manner of designing; for he fell very short of the fineness of Raphael's thinking. He had a particular genius for the decoration of places according to their customs. His invention in that kind of painting was full of ingenuity; grace and order are everywhere to be met with, and his dispositions, which are ordinary in his pictures, are wonderful in his ornaments: some of these he has made little, and some great, and placed them both with so much art, that they set off one another by comparison and contrast. His figures are disposed and designed according to Raphael's gusto; and if Raphael gave him at first some slight sketches of ornaments, as he did to Giovanni d'Udine, he executed them to admiration. The tapestries of the seven planets, in seven pieces, which Pierino designed for Diana de Poitiers, and which were, when De Piles wrote, with Monsieur the first president at Paris, shows sufficiently what he was, and that the above character does not exceed the truth.

PIERIS (anc. geog.), a mountain which is thought to have given name to Pieria of Macedonia; taking its name from Pierus a poet, who was the first that sacrificed to the Muses, thence called *Pierides*, if credit may be given to an ancient scholiast on Juvenal.

PIERRE D'AUTOMNE is a French name, translated from the Chinese, of a medicinal stone, celebrated in the east for curing all disorders of the lungs. Many imagine it had its name of the autumn-stone from its being only to be made at that season of the year; but it may certainly be made equally at all times. The Chinese chemists refer the various parts of the body to the several seasons of the year, and thus they refer the lungs to autumn. This is evident in their writings, and thus the stone for diseases of the lungs came to be called *autumn stone*. It is prepared as follows: They put 30 pints of the urine of a strong and healthy young man into a large iron pot, and set it over a gentle fire. When it begins to boil, they add to it, drop by drop, about a large tea-cup full of rape oil. They then leave it on the fire till the whole is evaporated to a thick substance like black mud. It is then taken out of the pot, and laid on a flat iron to dry, so that it may be powdered very fine. This powder is moistened with fresh oil, and the mass is put into a double crucible, surrounded with coals, where it stands till it be thoroughly dried again. This is again powdered, and put into a china vessel, which being covered with silk cloth and a double paper, they pour on it boiling water, which makes its way, drop by drop, through these coverings, till so much is got in as is sufficient to reduce it to a paste. This paste is well mixed together in the vessel it is kept in, and this is put into a vessel of water, and the whole set over the fire. The matter thus becomes again dried in *balneo maria*, and is then finished. *Observ. sur les Cout. de l'Asie*, p. 258.

PIERRE (St), is a large river in North America, scarcely inferior to the Rhine or the Danube, and navigable almost to its source. Together with many other large streams, it falls into the great river Mississippi.

PIERRE (St), or *St Peter's*, the capital of Martinico, was built in 1665, in order to overawe the mutineers.

Pieris,
Pierre.

Pierre
II
Piety.

neers of the island who rebelled against its proprietors, the second West India company, who were at the same time the proprietors of all the French Antilles. It is situated on the western side of the island. The town extends along the shore, and a battery that commands the road is erected on the west side, which is washed by the river Royolan, or St Peter. The town is divided into three wards; the middle, which is properly St Peter's, begins at the fort, and runs westward to the battery of St Nicholas. Under the walls of the second ward ships at anchor ride more securely than under the fort, on which account this ward is called the *Anchorage*. The third ward, called the *Gallery*, extends along the sea side from Fort St Peter to the Jesuits' River, and is the most populous part of the city. The houses of St Peter's ward are neat, commodious, and elegant, particularly those of the governor of the island, the intendant, and the other officers. The parish church of St Peter is a magnificent stone building which belonged to the Jesuits, with a noble front of the Doric order. The church of the Anchorage, which belongs to the Jacobine friars, is likewise of stone. It is a place of considerable trade, and is built with tolerable regularity. The houses are mostly constructed of a grey pumice-stone or lava, which is found on the strand; and the high-street is, according to Dr Isert, above an English mile in length. It is supposed to contain about 2000 houses, and 30,000 inhabitants, including negroes. St Pierre, with the whole of the flourishing island of Martinico, was taken from the French in the month of March 1794, by the British land and sea forces under the command of Sir Charles Grey and Sir John Jervis, and will now, we presume, continue annexed to the British crown: 125 vessels loaded with the produce of the island, and of great value, were captured, 71 of which were in the harbour of St Pierre.

PIETISTS, a religious sect sprung up among the Protestants of Germany, seeming to be a kind of mean between the Quakers of England and the Quietists of the Romish church. They despise all sorts of ecclesiastical polity, all school theology, and all forms and ceremonies, and give themselves up to contemplation and the mystic theology. Many gross errors are charged on the Pietists, in a book intitled *Manipulus Observationum Antipietisticarum*: but they have much of the air of polemical exaggeration, and are certainly not at all just. Indeed there are Pietists of various kinds: Some running into gross illusions, and carrying their errors to the overturning of a great part of the Christian doctrine, while others are only visionaries; and others are very honest and good, though perhaps misguided, people. They have been disgusted with the coldness and formality of other churches, and have thence become charmed with the fervent piety of the Pietists, and attached to their party, without giving into the grossest of their errors. See *Mosheim's Eccl. History*, vol. iv. p. 454.

PIETISTS, otherwise called the *Brethren and Sisters of the Pious and Christian Schools*, a society formed in the year 1678 by Nicholas Barre, and obliged by their engagements to devote themselves to the education of poor children of both sexes.

PIETOLA, anciently called *Andes*, is a place within two Italian miles of Mantua, famous for being the birth-place of Virgil.

PIETY, is a virtue which denotes veneration for the

Deity, and love and tenderness to our friends. This distinguished virtue, like many others, received among the Romans divine honours, and was made one of their gods. Acilius Glabrio first erected a temple to this divinity, which he did upon the spot on which a woman had fed with her own milk her aged father, who had been imprisoned by order of the senate, and deprived of all aliments. The story is well known, and is given at length in authors which are in the hands of every school-boy. See *Cicero de div. 1.* and *Valerius Maximus*, 5. c. 4. and our article *FILIAL Piety*, p. 238. col. 2d.

If piety was thus practised and thus honoured in Heathen antiquity, it surely ought not to be less so among Christians, to whom its nature is better defined, and to the practice of which they have motives of greater cogency. A learned and elegant writer has said that the want of piety arises from the want of sensibility; and his observations and arguments are so just and so well expressed, that we cannot do better than transcribe them.

"It appears to me (says Dr Knox), that the mind of man, when it is free from natural defects and acquired corruption, feels no less a tendency to the indulgence of devotion than to virtuous love, or to any other of the more refined and elevated affections. But debauchery and excess contribute greatly to destroy all the susceptible delicacy with which nature usually furnishes the heart; and, in the general extinction of our better qualities, it is no wonder that so pure a sentiment as that of piety should be one of the first to expire.

"It is certain that the understanding may be improved in a knowledge of the world, and in the arts of succeeding in it, while the heart, or whatever constitutes the seat of the moral and sentimental feelings, is gradually receding from its proper and original perfection. Indeed experience seems to evince, that it is hardly possible to arrive at the character of a complete man of the world, without losing many of the most valuable sentiments of uncorrupted nature. A complete man of the world is an artificial being; he has discarded many of the native and laudable tendencies of his mind, and adopted a new system of objects and propensities of his own creation. These are commonly gross, coarse, sordid, selfish, and sensual. All, or either of these attributes, tend directly to blunt the sense of every thing liberal, enlarged, disinterested; of every thing which participates more of an intellectual than of a sensual nature. When the heart is tied down to the earth by lust and avarice, it is not extraordinary that the eye should be seldom lifted up to heaven. To the man who spends his Sunday (because he thinks the day fit for little else) in the counting-house, in travelling, in the tavern, or in the brothel, those who go to church appear as fools, and the business they go upon as nonsense. He is callous to the feelings of devotion; but he is tremblingly alive to all that gratifies his senses or promotes his interest.

"It has been remarked of those writers who have attacked Christianity, and represented all religions merely as diversified modes of superstition, that they were indeed, for the most part, men of a metaphysical and a disputatious turn of mind, but usually little distinguished for benignity and generosity. There was,

Piety. amidst all their pretensions to logical sagacity, a cloudiness of ideas, and a coldness of heart, which rendered them very unfit judges on a question in which the heart is chiefly interested; in which the language of nature is more expressive and convincing, than all the dreary subtleties of the dismal metaphysicians. Even the reasoning faculty, on which we so greatly value ourselves, may be perverted by excessive refinement; and there is an abstruse, but vain and foolish philosophy, which philosophizes us out of the noblest parts of our noble nature. One of those parts of us is our instinctive sense of religion, of which not one of those brutes which the philosophers most admire, and to whose rank they wish to reduce us, is found in the slightest degree to participate.

"Such philosophers may be called, in a double sense, the enemies of mankind. They not only endeavour to entice man from his duty, but to rob him of a most exalted and natural pleasure. Such, surely, is the pleasure of devotion. For when the soul rises above this little orb, and pours its adoration at the throne of celestial Majesty, the holy fervour which it feels is itself a rapturous delight. Neither is this a declamatory representation, but a truth felt and acknowledged by all the sons of men; except those who have been defective in sensibility, or who hoped to gratify the pride or the malignity of their hearts by singular and pernicious speculation.

"Indeed all disputations, controversial and metaphysical writings on the subject of religion, are unfavourable to genuine piety. We do not find that the most renowned polemics in the church militant were at all more attentive than others to the common offices of religion, or that they were actuated by any peculiar degree of devotion. The truth is, their religion centered in their heads, whereas its natural religion is the heart. The heart! confined, alas! in colleges or libraries, unacquainted with all the tender charities of husband, father, brother, friend; some of them have almost forgotten that they possess a heart. It has long ceased to beat with the pulsations of love and sympathy, and has been engrossed by pride on conquering an adversary in the syllogistic combat, or by impotent anger on a defeat. With such habits, and so defective a system of feelings, can we expect that a doctor of the Sorbonne, or the disputing professor of divinity, should ever feel the pure flame of piety that glowed in the bosoms of Mrs Rowe, Mrs Talbot, or Mr Nelson?

"It is however certain, that a devotional taste and habit are very desirable in themselves, exclusive of their effects in meliorating the morals and disposition, and promoting present and future felicity. They add dignity, pleasure, and security to any age: but to old age they are the most becoming grace, the most substantial support, and the sweetest comfort. In order to preserve them, it will be necessary to preserve our sensibility; and nothing will contribute so much to this purpose as a life of temperance, innocence, and simplicity."

Of piety, as it denotes love and tenderness to our friends, there have been many distinguished instances both in ancient and modern times. See *FILIAL Piety*, *FRATERNAL* and *PARENTAL Affection*, &c.

The following example of filial piety in China, taken

from P. Du Halde's description of that country, will not we trust be disagreeable to our readers. "In the commencement of the dynasty of the Tang, Lou-tao-tsong, who was disaffected to the government, being accused of a fault, which touched his life, obtained leave from those who had him in custody, to perform the duties of the Tao to one of his deceased friends. He managed matters so well, that giving his keepers the slip, he fled to the house of Lou Nan-kin, with whom he had a friendship, and there hid himself. Lou Nan-kin, notwithstanding the strict search that was made, and the severity of the court against those who conceal prisoners that have escaped, would not betray his friend. However, the thing coming to be discovered, Lou Nan-kin was imprisoned; and they were just on the point of proceeding against him, when his younger brother presenting himself before the judge, *It is I, Sir, said he, who have hidden the prisoner; it is I who ought to die, and not my elder brother.* The eldest maintained on the contrary, that his younger brother accused himself wrongfully, and was not at all culpable. The judge, who was a person of great sagacity, sifted both parties so effectually, that he not only discovered that the younger brother was innocent, but even made him confess it himself: *It is true, Sir, said the younger all in tears, I have accused myself falsely; but I have very strong reasons for so doing. My mother has been dead for some time, and her corpse is not yet buried; I have a sister also who is marriageable, but is not yet disposed of: these things which my brother is capable of managing, I am not, and therefore desire to die in his stead. Vouchsafe to admit my testimony.* The commissioner gave an account of the whole affair to the court, and the emperor at his solicitation pardoned the criminal."

PIG, in zoology. See SUS.

Guinea-PIG. See MUS.

PIG of lead, the eighth part of a fother, amounting to 250 pounds weight.

PIGANIOL DE LA FORCE (John Aymar de), a native of Auvergne, of a noble family, applied himself with ardour to the study of geography, and of the history of France. With the view of improving himself in this study, he travelled into different provinces; and, in the course of his travels, made some important observations on the natural history, the commerce, the civil and ecclesiastical government of each province. These observations were of great use to him in compiling the works he has left behind him, of which the chief are, 1. An Historical and Geographical Description of France; the largest edition of which is that of 1753, in 15 vol. 12mo. It is the best work which has hitherto appeared upon that subject, though it contains a great number of inaccuracies and even errors. 2. A Description of Paris, in 10 vol. 12mo; a work equally entertaining and instructive, and much more complete than the description given by Germain Brice: besides, it is written with an elegant simplicity. He published an abridgment of it in 2 vol. 12mo. 3. A Description of the Castle and Park of Versailles, Marly, &c. in 2 vol. 12mo: it is very amusing, and pretty well executed. Piganol had also a concern with Abbé Nadal in the Journal of Trevoux. He died at Paris in February 1753, at the age of 80 years. This learned man was as much to be respected for his manners as for his talents. To a profound and varied knowledge

Piety
||
Piganiol.

Pigeon. knowledge he united great probity and honour, and all the politeness of a courtier.

PIGEON, in ornithology. See **COLUMBA**.

PIGEON-HOUSE is a house erected full of holes within for the keeping, breeding, &c. of pigeons, otherwise called a *dove cote*.

Any lord of manor may build a pigeon-house on his land, but a tenant cannot do it without the lord's licence. When persons shoot at or kill pigeons within a certain distance of the pigeon-house, they are liable to pay a forfeiture.

In order to erect a pigeon-house to advantage, it will be necessary, in the first place, to pitch upon a convenient situation; of which none is more proper than the middle of a spacious court-yard, because pigeons are naturally of a timorous disposition, and the least noise they hear frightens them. With regard to the size of the pigeon-house, it must depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too little; and as to its form, the round should be preferred to the square ones; because rats cannot so easily come at them in the former as in the latter. It is also much more commodious; because you may, by means of a ladder turning upon an axis, easily visit all the nests in the house, without the least difficulty; which cannot so easily be done in a square house. In order to hinder rats from climbing up the outside of the pigeon-house, the wall should be covered with tin plates to a certain height, about a foot and a half will be sufficient; but they should project out three or four inches at the top, to prevent their clambering any higher.

The pigeon-house should be placed at no great distance from water, that the pigeons may carry it to their young ones; and their carrying it in their bills will warm it, and render it more wholesome in cold weather. The boards that cover the pigeon-house should be well joined together, so that no rain may penetrate through it: and the whole building should be covered with hard plaster, and white-washed within and without, white being the most pleasing colour to pigeons. There must be no window, or other opening in the pigeon-house to the eastward; these should always face the south, for pigeons are very fond of the sun, especially in winter.

The nests or covers in a pigeon-house should consist of square holes made in the walls of a size sufficient to admit the cock and hen to stand in them. The first range of these nests should not be less than four feet from the ground, that the wall underneath being smooth, the rats may not be able to reach them. These nests should be placed in quincunx order, and not directly over one another. Nor must they be continued any higher than within three feet of the top of the wall: and the upper row should be covered with a board projecting a considerable distance from the wall, for fear the rats should find means to climb the outside of the house.

M. Duhamel thinks that pigeons neither feed upon the green corn, nor have bills strong enough to search for its seeds in the earth; but only pick up the grains that are not covered, which would infallibly become the prey of other animals, or be dried up by the sun. "From the time of the sprouting of the corn, says he, pigeons live chiefly upon the seeds of wild uncultivated

plants, and therefore lessen considerably the quantity of weeds that would otherwise spring up; as will appear from a just estimate of the quantity of grain necessary to feed all the pigeons of a well stocked dove-house." But Mr Worlidge and Mr Lisle allege facts in support of the contrary opinion. The latter relates, that a farmer in his neighbourhood assured him he had known an acre sowed with peas, and rain coming on so that they could not be harrowed in, every pea was fetched away in half a day's time by pigeons: and the former says, "It is to be observed, that where the flight of pigeons falls, there they fill themselves and away, and return again where they first rose, and so proceed over a whole piece of ground, if they like it. Although you cannot perceive any grain above the ground, they know how to find it. I have seen them lie so much upon a piece of about two or three acres sown with peas, that they devoured at least three parts in four of the seed, which, I am sure, could not be all above the surface of the ground. That their smelling is their principal director, I have observed; having sown a small plat of peas in my garden, near a pigeon-house, and covered them so well that not a pea appeared above ground. In a few days, a parcel of pigeons were hard at work in discovering this hidden treasure; and in a few days more I had not above two or three peas left out of about two quarts that were planted; for what they could not find before, they found when the buds appeared, notwithstanding they were hoed in, and well covered. Their smelling alone directed them, as I supposed, because they followed the ranges exactly. The injury they do at harvest on the peas, vetches, &c. is such that we may rank them among the greatest enemies the poor husbandman meets withal; and the greater, because he may not erect a pigeon-house, whereby to have a share of his own spoils; none but the rich being allowed this privilege, and so severe a law being also made to protect these winged thieves, that a man cannot encounter them, even in defence of his own property. You have therefore no remedy against them, but to affright them away by noises or such like. You may, indeed, shoot at them; but you must not kill them; or you may, if you can, take them in a net, cut off their tails, and let them go; by which means you will impound them: for when they are in their houses, they cannot bolt or fly out of the tops of them, but by the strength of their tails; after the thus weakening of which, they remain prisoners at home."

Mr Worlidge's impounding the pigeons reminds us of a humorous story of a gentleman who, upon a neighbouring farmer's complaining to him, that his pigeons were a great nuisance to his land, and did sad mischief to his corn, replied jokingly, Pound them, if you catch them trespassing. The farmer, improving the hint, steeped a parcel of peas in an infusion of *coculus indicus*, or some other intoxicating drug, and strewed them upon his grounds. The pigeons swallowed them, and soon remained motionless on the field: upon which the farmer threw a net over them, inclosed them in it, and carried them to an empty barn, from whence he sent the gentleman word that he had followed his directions with regard to the pounding of his pigeons, and desired him to come and release them.

CARRIER-PIGEON. See **CARRIER-Pigeon** and **COLUMBA**.

PIGEON

Pigeon.

PIGEON (Peter Charles Francis), curate of *St Peter du Regard*, in the diocese of Bayeux, was one of the priests lately belonging to the king's house at Winchester. He was born in Lower Normandy, of honest and virtuous parents, and of a decent fortune. His inclinations early led him to embrace the ecclesiastical state, from which neither the solicitations of his friends, nor the prospect of a more ample fortune on the death of his elder brother, could withdraw him. Several of his schoolfellows and masters, who are now resident in the king's house at Winchester, bear the most ample testimony to his assiduity, regularity, piety, and the sweetness of his disposition, during the whole course of his education. The sweetness of temper, in particular, was so remarkable, and so clearly depicted on his countenance, as to have gained him the esteem and affection of such of the inhabitants of Winchester as by any means had become acquainted with him. He was seven years employed in quality of vicar, or, as we should call it, *curate*, of a large parish in the diocese of Seez, where his virtues and talents had ample scope for exertion. His practice was to rise at five o'clock every morning, and to spend the whole time till noon (the usual time of dining for persons in his station) in prayer and study. The rest of the day, till evening, he devoted to visiting the sick, and other exterior duties of his function. In 1789, the year of the French Revolution, M. Pigeon was promoted to a curacy, or rather a rectory, in the diocese of Bayeux, called the *parish of St Peter du Regard*, near the town of Condé sur Noireau. It was easy for him to gain the good-will and the protection of his parishioners; but a Jacobin club in the above-mentioned town seemed to have no other subject to deliberate upon than the various ways of harassing and persecuting M. Pigeon and certain other priests in the neighbourhood, who had from motives of conscience refused the famous civic oath. It would be tedious to relate the many cruelties which were at different times exercised upon him, and the imminent danger of losing his life to which he was exposed, by the blows that were inflicted on him, by his being thrown into water, and being obliged to wander in woods and other solitary places, without any food or place to lay his head, in order to avoid his persecutors. We may form some judgment of the spirit of his persecutors from the following circumstance. Being disappointed on a particular occasion in the search they were making after M. Pigeon, with the view of amusing themselves with his sufferings, they made themselves amends by seizing his mother, a respectable lady of 74 years of age, and his two sisters, whom they placed upon asses with their faces turned backwards, obliging them in derision to hold the tails of these animals. Thus they were conducted in pain and ignominy throughout the whole town of Condé, for no other alleged crime except being the nearest relations of M. Pigeon. At length the decree for transporting all the ecclesiastics arrived; and this gentleman, with several others, after having been stripped of all their money, was shipped from Port Bessin, and landed at Portsmouth, where he was shortly after received into the establishment at Foxton, and, upon that being dissolved in order to make room for prisoners of war, into the king's house at Winchester. Being of a studious turn, he was accustomed, as many of his brethren also

were, to betake himself to the neighbouring lanes and thickets for the sake of greater solitude. With this view having about ten o'clock in the morning, Aug. 28. 1793, retired to a certain little valley, on the north-east side of a place called *Oram's Arbour*, the same place where the county elections for Hampshire are held, he was there found, between three and four o'clock in the afternoon, murdered, with the upper part of his skull absolutely broken from the lower part, and a large hedge-stake, covered with blood, lying by him, as were the papers on which he had been transcribing a manuscript sermon, with the hearing of which he had been much edified, and the sermon itself which he was copying, together with his pen, imbrued in blood. His watch was carried away, though part of the chain, which had by some means been broken, was left behind. He was writing the word *paradise*, the last letters of which remained unwritten when the fatal blow was given him, which appears evidently to have been discharged upon him from a gap in a hedge which was immediately behind him. At first the suspicion of this cruel murder fell upon the French democrats, who, to the number of 200, are prisoners of war, at the neighbouring town of Alresford, as one of that number, who had broken his parole, had, about three weeks before, been taken up in Winchester, and both there and at Alresford had repeatedly threatened to murder his uncle, a priest, whom he understood to be then at Winchester, not without fervent wishes of having it in his power to murder the whole establishment, consisting of more than 600 persons. However, as no French prisoner was seen that day in the neighbourhood of Winchester, as none of them were known to have left Alresford, it is evidently reasonable to acquiesce in the verdict of the coroner; namely, that the murder was committed by a person or persons unknown. The most noble marquis of Buckingham, whose munificence and kindness to those conscientious exiles, the emigrant French clergy, can only be conceived by those who have been witnesses of the same, with the truly respectable corps of the Buckinghamshire militia, then quartered at Winchester, joined in paying the last mark of respect to the unfortunate deceased, by attending his funeral, which was performed at the Roman Catholic burying-ground, called *St James's*, near the said city, on Saturday, August 29. He was just 38 years of age when he was murdered.

PIGMENTS, preparations used by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours. See *COLOUR-Making*, and *DYEING*.

PIGNEROL is a town of Italy in the province of Piedmont, in E. Long. 7. 15. Lat. 44. 45. situated on the river Chizon, 10 miles south-west of Turin, at the foot of the Alps, and the confines of Dauphiny. The town is small, but populous, and extremely well fortified by the king of Sardinia, since the treaty of Utrecht. It is defended by a citadel, on the top of the mountain, near which is the castle of Perouse, which was built at the entrance of the valley of that name.

PIGNET, or *Earthnut*. See *BUNION*.

PIGUS, in ichthyology, is the name of a species of leather mouthed fish, very much resembling the nature of the common carp; being of the same shape and size, and its eyes, fins, and fleshy palate, exactly the same; from the gills to the tail there is a crooked dotted line; the

Pigeon
Pign.

Pi habi-roth the back and sides are bluish, and the belly reddish.

It is covered with large scales; from the middle of each of which there rises a fine, pellucid, prickle, which is very sharp. It is an excellent fish for the table, being perhaps preferable to the carp: and it is in season in the months of March and April. It is caught in lakes in some parts of Italy, and is mentioned by Pliny, tho' without a name. Artedi says it is a species of cyprinus, and he calls it the *cyprinus*, called *piclo* and *pigus*.

PI-HAHIROTH, (Moses); understood to be a mouth or narrow pass between two mountains, called *Ghiroth*, or *Eiroth*, and lying not far from the bottom of the western coast of the Arabian gulf; before which mouth the children of Israel encamped, just before their entering the Red Sea, (Wells).

PISSKER, in ichthyology, is a fish of the mustela kind, commonly called the *fossile mustela*, or *fossile fish*. They are generally found as long as an ordinary man's hand is broad, and as thick as one's finger; but they sometimes grow much longer: the back is of grey with a number of spots and transverse streaks, partly black and partly blue; the belly is yellow, and spotted with red, white, and black; the white are the larger, the others look as if they were made with the point of a needle; and there is on each of the sides a longitudinal black and white line. There are some fleshy excrescences at the mouth, which are expanded in swimming; and when out of the water, they are contracted. These fishes run into caverns of the earth, in the sides of rivers, in marshy places, and penetrate a great way, and are often dug up at a distance from waters. Often, when the waters of brooks and rivers swell beyond their banks, and again cover them, they make their way out of the earth into the water; and when it deserts them, they are often left in vast numbers upon the ground, and become a prey to swine. It is thought to be much of the same kind with the figum fish; and it is indeed possible that the *pæcilia* of Schonefeldt is the same.

PIKE, in ichthyology. See *Esox*.

The pike never swims in shoals as most other fish do, but always lies alone; and is so bold and ravenous, that he will seize upon almost any thing less than himself. Of the ravenous nature of this fish we shall give the following instances. At Rycott in Oxfordshire, in the year 1749, in a moat surrounding the earl of Abingdon's seat, there was a jack or pike of such a monstrous size, that it had destroyed young swans feathers and all. An old cobb swan having hatched five young, one after another was lost till four were gone. At length an under gardener saw the fish seize the fifth. The old one fought him with her beak, and with the assistance of the gardener, released it although he had got it under water. In the year 1765 a large pike was caught in the river Ouze, which weighed upwards of 28 pounds, and was sold for a guinea. On gutting the fish, a watch with a black ribbon and two steel seals were found in its stomach, which, by the maker's name, &c. was found to belong to a person who had been drowned about six weeks before. This fish breeds but once in a year, which is in March. It is found in almost all fresh waters; but is very different in goodness, according to the nature of the places where it lives. The finest pike are those which feed in clear rivers; those in ponds and meres are inferior to

these, and the worst of all are those of the fen ditches. They are very plentiful in these last places, where the water is foul and coloured; and their food, such as frogs and the like, very plentiful, but very coarse; so that they grow large, but are yellowish and high belled, and differ greatly from those which live in the clearer waters.

The fishermen have two principal ways of catching the pike: by the ledger, and by the walking-bait.

The ledger-bait is fixed in one certain place, and may continue while the angler is absent. This must be a live bait, a fish or frog: and among fish, the dace, roach, and gudgeon, are the best; of frogs, the only caution is to choose the largest and yellowest that can be met with. If the bait be a fish, the hook is to be stuck through the upper lip, and the line must be 14 yards at least in length; the other end of this is to be tied to a bough of a tree, or to a stick driven into the ground near the pike's haunt, and all the line wound round a forked stick, except about half a yard. The bait will by this means keep playing so much under water, and the pike will soon lay hold of it.

If the bait be a frog, then the arming wire of the hook should be put in at the mouth, and out at the side; and with a needle and some strong silk, the hinder-leg of one side is to be fastened by one stitch to the wire-arming of the hook. The pike will soon seize this, and must have line enough to give him leave to get to his haunt and poach the bait.

The trolling for pike is a pleasant method also of taking them: in this a dead bait serves, and none is so proper as a gudgeon.

This is to be pulled about in the water till the pike seizes it; and then it is to have line enough, and time to swallow it: the hook is small for this sport, and has a smooth piece of lead fixed at its end to sink the bait; and the line is very long, and runs through a ring at the end of the rod, which must not be too slender at top.

The art of feeding pike, so as to make them very fat, is the giving them eels; and without this it is not to be done under a very long time; otherwise perch, while small, and their prickly fins tender, are the best food for them. Bream put into a pike-pond are a very proper food: they will breed freely, and their young ones make excellent food for the pike, who will take care that they shall not increase over much. The numerous shoals of roaches and ruds, which are continually changing place, and often in floods get into the pike's quarters, are food for them for a long time.

Pike, when used to be fed by hand, will come up to the very shore, and take the food that is given them out of the fingers of the feeder. It is wonderful to see with what courage they will do this, after a while practising; and it is a very diverting sight when there are several of them nearly of the same size, to see what striving and fighting there will be for the best bits when they are thrown in. The most convenient place is near the mouth of the pond, and where there is about half a yard depth of water; for, by that means, the offal of the feedings will all lie in one place, and the deep water will serve for a place to retire into and rest in, and will be always clean and in order.

Carp will be fed in the same manner as pike; and though by nature a fish as remarkably shy and timor-

Pike,
Pila.

rous as the pike is bold and fearless, yet by custom they will come to take their food out of the person's hand; and will, like the pike, quarrel among one another for the nicest bits.

PIKE, in war, an offensive weapon, consisting of a wooden shaft, 12 or 14 feet long, with a flat steel head, pointed, called the *spear*. This weapon was long in use among the infantry; but now the bayonet, which is fixed on the muzzle of the firelock, is substituted in its stead. It is still used by some of the officers of infantry, under the name of *sponton*. The Macedonian phalanx was a battalion of pikemen. See PHALANX.

PILA MARINA, or the *sea-ball*, in natural history, is the name of a substance very common on the shores of the Mediterranean, and elsewhere. It is generally found in the form of a ball about the size of the balls of horse-dung, and composed of a variety of fibrillæ irregularly complicated. Various conjectures have been given of its origin by different authors. John Bauhine tells us, that it consists of small hairy fibres and straws, such as are found about the sea plant called *alga vitriariorum*; but he does not ascertain what plant it owes its origin to. Imperatus imagined it consisted of the exuviae both of vegetable and animal bodies. Mercatus is doubtful whether it be a congeries of the fibrillæ of plants, wound up into a ball by the motion of the sea water, or whether it be not the workmanship of some sort of beetle living about the sea shore, and analogous to our common dung beetle's ball, which it elaborates from dung for the reception of its progeny. Schreckius says it is composed of the filaments of some plant of the reed kind: and Welchius supposes it is composed of the pappous part of the flowers of the reed. Maurice Hoffman thinks it the excrement of the hippopotamus; and others think it that of the phoca or sea calf. Klein, who had thoroughly and minutely examined the bodies themselves, and also what authors had conjectured concerning them, thinks that they are wholly owing to, and entirely composed of, the capillaments which the leaves, growing to the woody stalk of the *alga vitriariorum*, have when they wither and decay. These leaves, in their natural state, are as thick as a wheat straw, and they are placed so thick about the tops and extremities of the stalks, that they enfold, embrace, and lie over one another; and from the middle of these clusters of leaves, and indeed from the woody substance of the plant itself, there arise several other very long, flat, smooth, and brittle leaves. These are usually four from each tuft of the other leaves; and they have ever a common vagina, which is membranaceous and very thin. This is the style of the plant, and the *pila marina* appears to be a cluster of the fibres of the leaves of this plant, which cover the whole stalk, divided into their constituent fibres; and by the motion of the waves first broken and worn into short shreds, and afterwards wound up together into a roundish or longish ball.

PILA, was a ball made in a different manner according to the different games in which it was to be used. Playing at ball was very common amongst the Romans of the first distinction, and was looked upon as a manly exercise, which contributed both to amusement and health. The pila was of four sorts: 1st, *Follis* or *balloon*; 2d, *Pila Trigonalis*; 3d, *Pila Paganica*; 4th, *Harpassum*. All these come under the general

name of pila. For the manner of playing with each of them, see the articles FOLLIS, TRIGONALIS.

PILASTER, in architecture. See there, n^o 50, &c.

PILATE, or PONTIUS PILATE, was governor of Judea when our Lord was crucified. Of his family or country we know but little, though it is believed that he was of Rome, or at least of Italy. He was sent to govern Judea in the room of Gratus, in the year 26 or 27 of the vulgar era, and governed this province for ten years, from the 12th or 13th year of Tiberius to the 22d or 23d. He is represented both by Philo and Josephus as a man of an impetuous and obstinate temper, and as a judge who used to sell justice, and to pronounce any sentence that was desired, provided he was paid for it. The same authors make mention of his rapines, his injuries, his murders, the torments that he inflicted upon the innocent, and the persons he put to death without any form of process. Philo, in particular, describes him as a man that exercised an excessive cruelty during the whole time of his government, who disturbed the repose of Judea, and gave occasion to the troubles and revolt that followed after. St Luke (xiii. 1, 2, &c.) acquaints us, that Pilate had mingled the blood of the Galileans with their sacrifices; and that the matter having been related to Jesus Christ, he said, "Think you that these Galileans were greater sinners than other Galileans because they suffered this calamity. I tell you nay; and if you do not repent, you shall all perish in like manner. It is unknown upon what occasion Pilate caused these Galileans to be slain in the temple while they were sacrificing; for this is the meaning of that expression of mingling their blood with their sacrifices. Some think they were disciples of Judas the Gaulonite, who taught that the Jews ought not to pay tribute to foreign princes; and that Pilate had put some of them to death even in the temple; but there is no proof of this fact. Others think that these Galileans were Samaritans, whom Pilate cut to pieces in the village of Tirataba†, as they were preparing to go up to mount Gerizim, where a certain impostor had promised to discover treasures to them; but this event did not happen before the year 35 of the common era, and consequently two years after the death of Jesus Christ. At the time of our Saviour's passion, Pilate made some endeavours to deliver him out of the hands of the Jews. He knew they had delivered him up, and pursued his life with so much violence, only out of malice and envy (Matt. xxvii. 18.) His wife also, who had been disturbed the night before with frightful dreams, sent to tell him she desired him not to meddle in the affair of that just person (ib. 19.) He attempted to appease the wrath of the Jews, and to give them some satisfaction, by whipping Jesus Christ (John xix. 1. Matth. xxvii. 26.) He tried to take him out of their hands, by proposing to deliver him or Barabbas, on the day of the festival of the passover. Lastly, he had a mind to discharge himself from pronouncing judgment against him, by sending him to Herod king of Galilee (Luke xxiii. 7, 8.) When he saw all this would not satisfy the Jews, and that they even threatened him in some manner, saying he could be no friend to the emperor if he let him go (John xix. 12, 15.), he caused water to be brought, washed his hands before

Pilaster,
Pilare.† Joseph.
Ant. lib. 18.
c. 5.

Pilate.

all the people, and publicly declared himself innocent of the blood of that just person (Matt. xxvii. 23, 24.); yet at the same time he delivered him up to his soldiers, that they might crucify him. This was enough to justify Jesus Christ, as Calmet observes, and to show that he held him as innocent; but it was not enough to vindicate the conscience and integrity of a judge, whose duty it was as well to assert the cause of oppressed innocence as to punish the guilty and criminal. He ordered to be put over our Saviour's cross, as it were, an abstract of his sentence, and the motive of his condemnation (John xix. 19.), *Jesus of Nazareth, king of the Jews*, which was written in Latin, Greek, and Hebrew. Some of the Jews found fault with it, and remonstrated to Pilate that he ought to have written *Jesus of Nazareth, who pretended to be king of the Jews*. But Pilate could not be prevailed with to alter it, and gave them this peremptory answer, *That what he had written he had written*.

Towards evening, he was applied to for leave to take down the bodies from the cross, that they might not continue there the following day, which was the passover and the sabbath-day (John xix. 31.) This he allowed, and granted the body of Jesus to Joseph of Arimathea, that he might pay his last duties to it, (ib. 33.) Lastly, when the priests, who had solicited the death of our Saviour, came to desire him to set a watch about the sepulchre, for fear his disciples should steal him away by night, he answered them, that they had a guard, and might place them there themselves (Matt. xxvii. 65.) This is the substance of what the gospel tells us concerning Pilate.

Justin Martyr, Tertullian, Eusebius, and after them several others both ancient and modern, assure us, that it was formerly the custom for Roman magistrates to prepare copies of all verbal processes and judicial acts which they passed in their several provinces, and to send them to the emperor. And Pilate, in compliance to this custom, having sent word to Tiberius of what had passed relating to Jesus Christ, the emperor wrote an account of it to the senate, in a manner that gave reason to judge that he thought favourably of the religion of Jesus Christ, and showed that he should be willing they would decree divine honours to him. But the senate was not of the same opinion, and so the matter was dropped. It appears by what Justin says of these acts, that the miracles of Jesus Christ were mentioned there, and even that the soldiers had divided his garments among them. Eusebius insinuates that they spoke of his resurrection and ascension. Tertullian and Justin refer to these acts with so much confidence as would make one believe they had them in their hands. However, neither Eusebius nor St Jerome, who were both inquisitive, understanding persons, nor any other author that wrote afterwards, seem to have seen them, at least not the true and original acts; for as to what we have now in great number, they are not authentic, being neither ancient nor uniform. There are also some pretended letters of Pilate to Tiberius, giving a history of our Saviour, but they are universally allowed to be spurious.

Pilate being a man that, by his excessive cruelties and rapine, had disturbed the peace of Judea during the whole time of his government, was at length deposed by Vitellius the proconsul of Syria, in the 36th

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year of Jesus Christ, and sent to Rome to give an account of his conduct to the emperor. But though Tiberius died before Pilate arrived at Rome, yet his successor Caligula banished him to Vienne in Gaul, where he was reduced to such extremity that he killed himself with his own hands. The evangelists call him governor, though in reality he was no more than procurator of Judea, not only because governor was a name of general use, but because Pilate in effect acted as one, by taking upon him to judge in criminal matters; as his predecessors had done, and other procurators in the small provinces of the empire where there was no proconsul, constantly did. See *Calmet's Dictionary*, *Echard's Ecclesiastical History*, and *Beausobre's Annot.*

With regard to Pilate's wife, the general tradition is, that she was named Claudia Procula or Proscula; and in relation to her dream, some are of opinion that as she had intelligence of our Lord's apprehension, and knew by his character that he was a righteous person, her imagination, being struck with these ideas, did naturally produce the dream we read of; but others think that this dream was sent providentially upon her, for the clearer manifestation of our Lord's innocence.

PILATRE DU ROSIER (Francis), was born at Metz the 30th of March 1756. He was first apprentice to an apothecary there, and afterwards went to Paris in quest of farther improvement. He applied himself to the study of natural history and of natural philosophy, and had already acquired some reputation, when the discovery of M. de Montgolfier had just astonished the learned world. On the 25th of October 1783, he attempted an aerial voyage with the Marquis of Arlande. He performed several other excursions in this way with brilliant success, in the presence of the royal family of France, of the king of Sweden, and of Prince Henry of Prussia. He then resolved to pass into England by means of his aerial vehicle, and for that purpose he repaired to Boulogne, whence he rose about 7 o'clock in the morning of the 15th June 1785; but in half an hour after he set out, the balloon took fire, and the aeronaut, with his companion M. Romaine, were crushed to death by the fall of that machine, which was more ingenious, perhaps, than useful*. Pilatre's social virtues and courage, which were very distinguished, heightened the regret of his friends for his loss. His merit as a chemist, and his experiments as an aeronaut, procured him some pecuniary reward, and some public appointments. He had a pension from the King, was intendant of Monsieur's cabinets of natural philosophy, chemistry, and natural history, professor of natural philosophy, a member of several academies, and principal director of Monsieur's museum.

PILCHARD, in ichthyology, a fish which has a general likeness to the herring, but differs in some particulars very essential. The body of the pilchard is less compressed than that of the herring, being thicker and rounder: the nose is shorter in proportion, and turns up; the under jaw is shorter. The back is more elevated; the belly less sharp. The dorsal fin of the pilchard is placed exactly in the centre of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the herring dips at the head. The scales of the pilchard adhere very closely, whereas those of the herring very easily drop off. The pil-

Pilate,
Pilchard.

* See Aeronautics,
no 34.

Pilchard, chard is in general less than the herring; but it is fatter, or more full of oil.

† See *Clw. sea.*

The pilchard appears in vast shoals off the Cornish coasts about the middle of July, disappearing the beginning of winter, yet sometimes a few return again after Christmas. Their winter retreat is the same with that of the herring, and their motives for migrating the same †. They affect, during summer, a warmer latitude; for they are not found in any quantities on any of our coasts except those of Cornwall, that is to say, from Fowey harbour to the Scilly isles, between which places the shoals keep shifting for some weeks. The approach of the pilchard is known by much the same signs as those that indicate the arrival of the herring. Persons, called in Cornwall *buers*, are placed on the cliffs, to point to the boats stationed off the land the course of the fish. By the 1st of James I. c. 23, fishermen are empowered to go on the grounds of others to hue, without being liable to actions of trespass, which before occasioned frequent law-suits.

The emoluments that accrue to the inhabitants of that county are great, and are best expressed in the words of Dr W. Borlase, in his *Account of the Pilchard Fishery*. "It employs a great number of men on the sea, training them thereby to naval affairs; employs men, women, and children, at land, in salting, pressing, washing, and cleaning, in making boats, nets, ropes, casks, and all the trades depending on their construction and sale. The poor is fed with the offals of the captures; the land with the refuse of the fish and salt; the merchant finds the gains of commission and honest commerce; the fisherman, the gains of the fish. Ships are often freighted hither with salt, and into foreign countries with the fish, carrying off at the same time part of our tin. The usual number of hogsheds of fish exported each year, for ten years, from 1747 to 1756 inclusive, from the four ports of Fowey, Falmouth, Penzance, and St Ives, in all amounts to 29,794; since it appears that Fowey has exported yearly 1732 hogsheds; Falmouth, 14,631 hogsheds and two-thirds; Penzance and Mounts-Bay, 12,149 hogsheds and one-third; St Ives, 1282 hogsheds. Every hogshed for ten years last past, together with the bounty allowed for each when exported, and the oil made out of each, has amounted, one year with another at an average, to the price of L. 1 : 13 : 3; so that the cash paid for pilchards exported has, at a medium, annually amounted to the sum of L. 49,532, 10s." The numbers that are taken at one shooting out of the nets is amazingly great. Mr Pennant says, that Dr Borlase assured him, that on the 5th of October 1767, there were at one time inclosed in St Ives's Bay 7000 hogsheds, each hogshed containing 35,000 fish, in all 245,000,000.

PILE, in heraldry, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the shield.

PILE, among the Greeks and Romans, was a pyramid built of wood, whereon were laid the bodies of the deceased to be burnt. It was partly in the form of an altar, and differed in height according to the quality of the person to be consumed. Probably it might originally be considered as an altar, on which the dead were consumed as a burnt-offering to the in-

fernal deities. The trees made use of in the erection of a funeral pile were such as abounded in pitch or rosin, as being most combustible; if they used any other wood, it was split that it might the more easily catch fire. Round the pile were placed cypress boughs to hinder the noisome smell. See FUNERAL.

PILE, in building, is used for a large stake rammed into the ground in the bottom of rivers, or in marshy land, for a foundation to build upon.

Pile is also used among architects for a mass of building.

PILE, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms or other figure and inscription to be struck on the coin. See COINAGE.

Accordingly we still call the arms-side of a piece of money the *pile*, and the head the *cross*; because in ancient coin, a cross usually took the place of the head in ours.

PILE-Engine, a very curious machine invented by Mr Vauloue for driving the piles of Westminster-bridge. It is represented Plate CCCXCIII. A is a great upright shaft or axle, on which are the great wheel B, and the drum C, turned by horses joined to the bars S, S. The wheel B turns the trundle X, on the top of whose axis is the fly O, which serves to regulate the motion, and also to act against the horses, and to keep them from falling when the heavy ram Q is discharged to drive the pile P down into the mud in the bottom of the river. The drum C is loose upon the shaft A, but is locked to the wheel B by the bolt Y. On this drum the great rope HH is wound; one end of the rope being fixed to the drum, and the other to the follower G, to which it is conveyed over the pulleys I and K. In the follower G is contained the tongs F, that takes hold of the ram Q by the staple R, for drawing it up. D is a spiral or fusy fixed to the drum, on which is wound the small rope T that goes over the pulley U, under the pulley V, and is fastened to the top of the frame at 7. To the pulley-block V is hung the counterpoise W, which hinders the follower T from accelerating as it goes down to take hold of the ram; for as the follower tends to acquire velocity in its descent, the line T winds downwards upon the fusy, on a larger and larger radius, by which means the counterpoise W acts stronger and stronger against it; and so allows it to come down with only a moderate and uniform velocity. The bolt Y locks the drum to the great wheel, being pushed upward by the small lever 2, which goes through a mortise in the shaft A, turns upon a pin in the bar 3, fixed to the great wheel B, and has a weight 4, which always tends to push up the bolt Y through the wheel into the drum. L is the great lever turning on the axis m, and resting upon the forcing bar 5, 5, which goes through a hollow in the shaft A, and bears up the little lever 2.

By the horses going round, the great rope H is wound about the drum C, and the ram Q is drawn up by the tongs F in the follower G, until the tongs come between the inclined planes E; which, by shutting the tongs at the top, opens it at the foot, and discharges the ram which falls down between the guides b b upon the pile P, and drives it by a few strokes as far into the mud as it will go; after which, the top part is sawed off close to the mud by an engine for that purpose.

Immediately

Pile. Immediately after the ram is discharged, the piece 6 upon the follower G takes hold of the ropes *aa*, which raise the end of the lever L, and cause its end N to descend and press down the forcing bar 5 upon the little lever 2, which, by pulling down the bolt Y, unlocks the drum C from the great wheel B; and then the follower being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs slip over the staple R, and the weight of their heads causes them to fall outward, and shut upon it. Then the weight 4 pushes up the bolt Y into the drum, which locks it to the great wheel, and so the ram is drawn up as before.

As the follower comes down, it causes the drum to turn backward, and unwinds the rope from it, whilst the horses, great wheel, trundle, and fly, go on with an uninterrupted motion; and as the drum is turning backward, the counterpoise W is drawn up, and its rope T wound upon the spiral fusy D.

There are several holes in the under side of the drum, and the bolt Y always takes the first one that it finds when the drum stops by the falling of the follower upon the ram; until which stoppage the bolt has not time to slip into any of the holes.

This engine was placed upon a barge on the water, and so was easily conveyed to any place desired. The ram was a ton weight; and the guides *bb*, by which it was let fall, were 30 feet high.

A new machine for driving piles has been invented lately by Mr S. Bunce of Kirby street, Hatten street, London. It will drive a greater number of piles in a given time than any other; and can be constructed more simply to work by horses than Mr Vauloué's engine above described.

Plate CCCXCHII Fig. 1 and 2 represent a side and front section of the machine. The chief parts are A, fig. 1, which are two endless ropes, or chains connected by cross pieces of iron B (see fig. 2) corresponding with two cross grooves cut diametrically opposite in the wheel C (fig. 1.), into which they are received; and by which means the rope or chain A is carried round. FHK is a side-view of a strong wooden frame moveable on the axis H. D is a wheel, over which the chain passes and turns within at the top of the frame. It moves occasionally from F to G upon the centre H, and is kept in the position F by the weight I fixed to the end K. Fig. 3. L is the iron ram, which is connected with the cross pieces by the hook M. N is a cylindrical piece of wood suspended at the hook at O, which by sliding freely upon the bar that connects the hook to the ram, always brings the hook upright upon the chain when at the bottom of the machine, in the position of GP. See fig. 1.

When the man at S turns the usual crane-work, the ram being connected to the chain, and passing between the guides, is drawn up in a perpendicular direction; and when it is near the top of the machine, the projecting bar Q of the hook strikes against a cross piece of wood at R (fig. 1.); and consequently discharges the ram, whilst the weight I of the moveable frame instantly draws the upper wheel into the position shown at F, and keeps the chain free of the ram in its descent. The hook, while descending, is prevented from catching

the chain by the wooden piece N. For that piece being specifically lighter than the iron weight below, and moving with a less degree of velocity cannot come in contact with the iron till it is at the bottom and the ram stops. It then falls and again connects the hook with the chain, which draws up the ram, as before.

Mr Bunce has made a model of this machine, which performs perfectly well; and he observes, that, as the motion of the wheel C is uninterrupted, there appears to be the least possible time lost in the operation.

PILE-Worms, are a kind of worms found in the piles of the sea-dikes in Holland. They are of very various sizes; for some of the young ones are not above an inch or two in length, while others have been found thirteen or fourteen inches long. The heads of these creatures are covered with two hard shells or hemicrania; which together form a figure resembling an augre; and with which they bore the wood. The best remedy against them is, to perforate the pile with many small holes about an inch asunder; then it must be done over with a varnish in the hottest sun; and, while the varnish is hot, brick-dust must be strewed over it: and this being several times repeated, the pile will be covered with a strong crust absolutely impenetrable to all insects.

PILES, in medicine, the same with hæmorrhoids. See MEDICINE, n° 240, &c.

PILEUS, in Roman antiquity, was the ordinary cap or hat worn at public shows and sacrifices, and by the freedmen. It was one of the common rewards assigned to such gladiators as were slaves, in token of their obtaining freedom.

PILEWORT (*Ranunculus ficaria*, Lin.), the root. This is a very small plant, found in moist meadows and by hedge sides. The roots consist of slender fibres with some little tubercles among them, which are supposed to resemble the hæmorrhoids. From thence it has been concluded, that this root must needs be of wonderful efficacy for the cure of that distemper: to the taste, it is little other than mucilaginous; and although still retained in several of the foreign pharmacopœias, it is hardly in use in this country.

PILGRIM, one who travels through foreign countries to visit holy places, and to pay his devotion to the relics of dead saints. See PILGRIMAGE.

The word is formed from the Flemish *pelgrim*, or Italian *pelegrino*, which signifies the same; and those originally from the Latin *peregrinus*, a "stranger or traveller."

PILGRIMAGE, a kind of religious discipline, which consists in taking a journey to some holy place in order to adore the relics of some deceased saint. Pilgrimages began to be made about the middle ages of the church; but they were most in vogue after the end of the 11th century, when every one was for visiting places of devotion, not excepting kings and princes themselves; and even bishops made no difficulty of being absent from their churches on the same account. The places most visited were Jerusalem, Rome, Compostella (A), and Tours; but the greatest numbers now resort to Loretto, in order to visit the chamber of the

5 B 2

blessed

(A) It deserves to be remarked here, that in the year 1428, under the reign of Henry VI. abundance of licences

Pilgrimage.

blest virgin, in which she was born, and brought up her son Jesus till he was 12 years of age. For the pilgrimage of the followers of Mahomet, see MAHOMETANISM, p. 465.

In every country where popery was established, pilgrimages were common; and in those countries which are still popish, they continue. In England, the shrine of St Thomas à Becket was the chief resort of the pious; and in Scotland, St Andrew's; where, as tradition informs us, was deposited a leg of the holy apostle. In Ireland they still continue; for, from the beginning of May till the middle of August every year, crowds of popish penitents from all parts of that country resort to an island near the centre of *Lough-fin*, or *White Lake*, in the county of Donnegal, to the amount of 3000 or 4000. These are mostly of the poorer sort, and many of them are proxies for those who are richer; some of which, however, together with some of the priests and bishops on occasion, make their appearance there. When the pilgrim comes within sight of the holy lake, he must uncover his hands and feet, and thus walk to the water-side, and is taken to the island for sixpence. Here there are two chapels and 15 other houses; to which are added confessionals, so contrived, that the priest cannot see the person confessing. The penance varies according to the circumstances of the penitent; during the continuance of which (which is sometimes three, six, or nine days) he subsists on oatmeal, sometimes made into bread. He traverses sharp stones on his bare knees or feet, and goes through a variety of other forms, paying sixpence at every different confession. When all is over, the priest bores a gimblet-hole through the pilgrim's staff near the top, in which he fastens a cross peg; gives him as many holy pebbles out of the lake as he cares to carry away, for amulets to be presented to his friends, and so dismisses him, an object of veneration to all other papists not thus initiated; who no sooner see the pilgrim's cross in his hands, than they kneel down to get his blessing.

There are, however, other parts of Ireland sacred to extraordinary worship and pilgrimage; and the number of holy wells, and miraculous cures, &c. produced by them, is very great. That such things should exist in this enlightened age, and in a Protestant country, is indeed strange; but our wonder ceases, when we reflect that it is among the lowest, and perhaps the worst of the people. They who carry external religion to an extreme, and place that confidence in ceremony which belongs only to the spirit of it, are seldom distinguished either for their wisdom or their virtue. We do not deny, however, that they who carry matters to the other extreme, may be equally destitute of real knowledge and genuine morality.

Dr Johnson, in his *Rasselas*, gives us some observations on pilgrimage, which are so much to the purpose,

that we think we cannot do better than lay them before our readers. "Pilgrimage (said Imlac, into whose mouth the observations are put), like many other acts of piety, may be reasonable or superstitious according to the principles upon which it is performed. Long journeys in search of truth are not commanded. Truth, such as is necessary to the regulation of life, is always found where it is honestly sought: change of place is no natural cause of the increase of piety, for it inevitably produces dissipation of mind. Yet since men go every day to view the fields where great actions have been performed, and return with stronger impressions of the event, curiosity of the same kind may naturally dispose us to view that country whence our religion had its beginning: and I believe no man surveys those awful scenes without some confirmation of holy resolutions. That the Supreme Being may be more easily propitiated in one place than in another, is the dream of idle superstition; but that some places may operate upon our own minds in an uncommon manner, is an opinion which hourly experience will justify. He who supposes that his vices may be more successfully combated in Palestine, will, perhaps, find himself mistaken; yet he may go thither without folly: he who thinks they will be more freely pardoned, dishonours at once his reason and religion."

PILKINGTON (Lætitia), a famous poetical genius, the daughter of Dr Van Lewin, a physician of Dublin, where she was born in 1712. She was married very young to the Rev. Matthew Pilkington, a poet also of no inconsiderable merit; and these two wits, as is often the case, lived very unhappily together. They were at length totally separated, on the husband accidentally discovering a gentleman in her bedchamber at two o'clock in the morning; a circumstance which she accounted for in a very unsatisfactory manner. The story is told at large in her Memoirs; where she says, "Lovers of learning, I am sure, will pardon me, as I solemnly declare it was the attractive charms of a new book, which the gentleman would not lend me, but consented to stay till I read it through, that was the sole motive of my detaining him." As there are not wanting some who form objections to marrying learned wives, the chance of such literary assignations may perhaps be added to the list of them. After this unlucky adventure, Mrs Pilkington came to London; and having recourse to her pen for subsistence, through the means of Colley Cibber, she lived some time on the contributions of the great. She was however thrown into the Marshalsea for debt; and being set at liberty, opened a pamphlet shop. She raised at length a handsome subscription for her Memoirs; which are written with great sprightliness and wit, containing several entertaining anecdotes of dean Swift with whom she was intimate, as well as many pretty little

Pilgrimage, Pilkington.

cences were granted from the crown of England to captains of English ships, for carrying numbers of devout persons to the shrine of St James of Compostella in Spain; provided, however, that those pilgrims should first take an oath not to take any thing prejudicial to England, nor to reveal any of its secrets, nor to carry out with them any more gold or silver than what would be sufficient for their reasonable expences. In this year there went out thither from England, on the said pilgrimage, the following number of persons. From London 280, Bristol 200, Weymouth 122, Dartmouth 90, Yarmouth 60, Jersey 60, Plymouth 40, Exeter 30, Poole 24, Ipswich 20, in all 926 persons.

Pill
||
Pillars.

little pieces of her poetry. This ingenious but unhappy woman is said at last to have killed herself with drinking at Dublin, in 1750.

PILL, in pharmacy, a form of medicine resembling a little ball, to be swallowed whole; invented for such as cannot take bitter and ill-tasted medicinal draughts; as also to keep in readiness for occasional use without decaying. See PHARMACY-Index.

PILLAR, in architecture. See ARCHITECTURE.

PILLAR, in the manege, is the centre of the ring, or manege-ground, round which a horse turns, whether there be a pillar in it or not. Besides this, there are pillars on the circumference or sides of the manege-ground, placed at certain distances, by two and two, from whence they are called the *two pillars*, to distinguish them from that of the centre. The use of the pillar in the centre is for regulating the extent of ground, that the manege upon the volts may be performed with method and justness, and that they may work in a square, by rule and measure, upon the four lines of the volts; and also to break unruly high-mettled horses, without endangering the rider. The two pillars are placed at the distance of two or three paces one from the other; and the horse is put between those, to teach him to rise before and yerk out behind, and put himself upon raised airs, &c. either by the aids or chastisements.

Pompey's PILLAR. See ALEXANDRIA, p. 393.

PILLARS, in antiquarian topography, are large single stones set up perpendicularly. Those of them which are found in this country have been the work of the Druids; but as they are the most simple of all monuments, they are unquestionably more ancient than druidism itself. They were placed as memorials recording different events; such as remarkable instances of God's mercies, contracts, singular victories, boundaries, and sometimes sepulchres. Various instances of these monuments erected by the patriarchs occur in the Old Testament: such was that raised by Jacob at Lug, afterwards by him named *Bethel*; such also was the pillar placed by him over the grave of Rachel. They were likewise marks of execrations and magical talismans.

These stones, from having long been considered as objects of veneration, at length were by the ignorant and superstitious idolatrously worshipped; wherefore, after the introduction of Christianity, some had crosses cut on them, which was considered as snatching them from the service of the devil. Vulgar superstition of a later date has led the common people to consider them as persons transformed into stone for the punishment of some crime, generally that of sabbath-breaking; but this tale is not confined to single stones, but is told also of whole circles: witness the monuments called the *hurlers* in Cornwall, and *Rollorick stones* in Warwickshire. The first are by the vulgar supposed to have been once men, and thus transformed as a punishment for playing on the Lord's day at a game called *hurling*; the latter, a pagan king and his army.

At Wilton, where the earl of Pembroke has a very magnificent house, there is a pillar of one piece of white Egyptian granite, which was brought from the temple of Venus Genetrix at Rome, near 14 feet high and 22 inches diameter, with an inscription to Astarte or Venus.

PILLORY (*collisfrigium*, "collum stringens;" *pilloria*, from the French *pilleur*, i. e. *depeculator*, or *pelori*; derived from the Greek *πύλη*, *janua*, a "door," because one standing on the pillory puts his head as it were through a door, and *ὀραω*, *video*), is an engine made of wood to punish offenders, by exposing them to public view, and rendering them infamous. There is a *statute of the pillory*, 51 Hen. III. And by statute it is appointed for bakers, forestallers, and those who use false weights, perjury, forgery, &c. 3 *Inst.* 219. Lords of leets are to have a pillory and tumbrel, or it will be the cause of forfeiture of the leet; and a village may be bound by prescription to provide a pillory, &c. 2 *Hawk.* P. C. 73.

PILOT, the officer who superintends the navigation, either upon the sea-coast or on the main ocean. It is, however, more particularly applied by our mariners to the person charged with the direction of a ship's course on or near the sea-coast, and into the roads, bays, rivers, havens, &c. within his respective district.

Pilots of ships, taking upon them to conduct any ship from Dover, &c. to any place up the river Thames, are to be first examined and approved by the master and wardens of the society of Trinity House, &c. or shall forfeit 10 l. for the first offence, 20 l. for the second, and 40 l. for every other offence; one moiety to the informer, the other to the master and wardens; but any master or mate of a ship may pilot his own vessel up the river: and if any ship be lost through the negligence of any pilot, he shall be for ever after disabled to act as a pilot. 3 Geo. I. c. 13. Also the lord-warden of the cinque ports may make rules for the government of pilots, and order a sufficient number to ply at sea to conduct ships up to the Thames: 7 Geo. I. c. 21. No person shall act as a pilot on the Thames, &c. (except in collier ships) without a licence from the master and wardens of Trinity House at Deptford, on pain of forfeiting 20 l. And pilots are to be subject to the government of that corporation; and pay ancient dues, not exceeding 1 s. in the pound, out of wages, for the use of the poor thereof. Stat. 5 Geo. II. c. 20.

By the former laws of France, no person could be received as pilot till he had made several voyages and passed a strict examination; and after that, on his return in long voyages, he was obliged to lodge a copy of his journal in the admiralty; and if a pilot occasioned the loss of a ship, he had to pay 100 livres fine, and to be for ever deprived of the exercise of pilotage; and if he did it designedly, be punished with death. *Lex Mercat.* 70. 71.

The laws of Oleron ordain, That if any pilot designedly misguide a ship, that it may be cast away, he shall be put to a rigorous death, and hung in chains: and if the lord of a place, where a ship be thus lost, abet such villains in order to have a share of the wreck, he shall be apprehended, and all his goods forfeited for the satisfaction of the persons suffering; and his person shall be fastened to a stake in the midst of his own mansion, which, being fired on the four corners, shall be burned to the ground, and he with it. *Leg. Ol.* c. 25. And if the fault of a pilot be so notorious, that the ship's crew see an apparent wreck, they may lead him to the hatches, and strike off his head; but the common-law denies this hasty execution: an ignorant pilot

Pillory,
Pilot.

Pilot.

pilot is sentenced to pass thrice under the ship's keel by the laws of Denmark. *Lex Mercat.* 70.

The regulations with regard to pilots in the royal navy are as follow: "The commanders of the king's ships, in order to give all reasonable encouragement to so useful a body of men as pilots, and to remove all their objections to his Majesty's service, are strictly charged to treat them with good usage, and an equal respect with warrant-officers.

"The purser of the ship is always to have a set of bedding provided on board for the pilots; and the captain is to order the boatswain to supply them with hammocks, and a convenient place to lie in, near their duty, and apart from the common men; which bedding and hammocks are to be returned when the pilots leave the ship.

"A pilot, when conducting one of his Majesty's ships in pilot-water, shall have the sole charge and command of the ship, and may give orders for steering, setting, trimming, or furling the sails; tacking the ship; or whatever concerns the navigation: and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to observe the conduct of the pilot; and if he judges him to behave so ill as to bring the ship into danger, he may remove him from the command and charge of the ship, and take such methods for her preservation as shall be judged necessary; remarking upon the log book, the exact hour and time when the pilot was removed from his office, and the reasons assigned for it.

"Captains of the king's ships, employing pilots in foreign parts of his majesty's dominions, shall, after performance of the service, give a certificate thereof to the pilot, which being produced to the proper naval officer, he shall cause the same to be immediately paid; but if there be no naval-officer there, the captain of his majesty's ship shall pay him, and send the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

"Captains of his Majesty's ships, employing foreign pilots to carry the ships they command into or out of foreign ports, shall pay them the rates due by the establishment or custom of the country, before they discharge them; whose receipts being duly vouched, and sent, with a certificate of the service performed, to the navy-board, they shall cause them to be paid with the same exactness as they do bills of exchange." *Regulations and Instructions of the Sea-service, &c.*

Plate
CCCXCII.

Pilot-Fish, or *Gasterosteus Ductor*, in ichthyology, is a species of the gasterosteus, and is found in the Mediterranean and in the Atlantic ocean, chiefly towards the equator. Catesby, who gives a figure of it in its natural size, together with a short description, calls it *perca marina scæria*, or rudder-fish. One of them, which Gronovius describes, was about four inches in length, and its greatest breadth little more than an inch: the head is about a third of the body, and covered, excepting the space between the snout and the eye, with scales scarcely perceptible, and covering one another like tiles; the iris of the eye is a silver grey; the jaws are of equal size, and furnished as well as the palate with small teeth disposed in groups; there is also a longitudinal row of teeth on the tongue. The trunk of the pilot-fish is oblong, a little rounded, but it appears quadrangular towards the tail, because at

this place the lines are thicker, and form a kind of membranaceous projection. The back fin is long, and furnished with seven radii; on the fore-part of this fin are three moveable prickles very short; the fins on the breast have each of them 20 radii, forked at their extremity; the abdominal fins have six; that of the anus has 17 branches, of which the first is longest; this fin is preceded by a small moveable prickle; that of the tail is thick, large, and forked. The pilot-fish is of a brownish colour, changing into gold; a transversal black belt crosses the head; a second passes over the body at the place of the breast; a third near the moveable prickles of the back; three others near the region of the anus; and a seventh at the tail.

Seafaring people observe, that this fish frequently accompanies their vessels; and as they see it generally towards the fore part of the ship, they imagined that it was guiding and tracing out the course of the vessel, and hence it received the name of *pilot-fish*.

Osbec tells us, that they are shaped like those mackerels which have a transversal line across the body. "Sailors (continues he) give them the name of *pilots*, because they closely follow the dog-fish, swimming in great shoals round it on all sides. It is thought that they point out some prey to the dog-fish; and indeed that fish is very unwieldy. They are not only not touched, but also preserved by it against all their enemies. Psalm cvi. ver. 2. 'Who can utter the mighty acts of the Lord? Who can show forth all his praise?' This scarce and remarkable fish I had an opportunity of describing: it is *Scomber caeruleo-albus cingulis transversis nigris sex, dorso monopterygio*. See the *Memoirs of the Swedish Academy of Sciences for the year 1755*, vol. xvi. p. 71. of the Swedish edition."

It likewise follows the shark, apparently for the purpose of devouring the remains of its prey. It is pretended that it acts as its pilot. The manner in which it attends the shark, according to M. Daubenton, may have given rise to this name. It is said to swim at the height of a foot and a half from the snout of this voracious animal, to follow and imitate all its movements, and to seize with address every part of its prey which the shark allows to escape, and which is light enough to buoy up towards the surface of the water. When the shark, which has its mouth below, turns to seize any fish, the pilot-fish starts away; but as soon as the shark recovers his ordinary situation, it returns to its former place. Barbut informs us, that these fishes propagate their species like the shark. He adds, that in the gulph of Guinea those fishes follow ships for the sake of the offals and human excrements; and hence the Dutch give them the name of *dung-fish*. It is remarkable, that though so small they can keep pace with ships in their swiftest course.

PILTEN, a division of Courland, which lies in Courland properly so called, derives its name from the ancient castle or palace of Pilten, built by Valdemar II. king of Denmark about the year 1220, when he founded a bishop's see in this country for the more effectual conversion of its Pagan inhabitants. This district afterwards successively belonged to the Germans, then again to the king of Denmark, the duke of Courland, and to Poland; and by virtue of the instrument of regency drawn up for this district in the year 1717, the government is lodged in seven Polish senators or coun-

Pilot,
Pilten.

Pilum,
Pimento.

counsellors, from whom an appeal lies to the king. The bishop of Samogitia also styles himself bishop of Pilten.

The most remarkable part of this district is the promontory of Domefnefs, which projects northward into the gulf of Livonia. From this cape a sand-bank runs four German miles farther into the sea, half of which lies under water, and cannot be discerned. To the east of this promontory is an unfathomable abyss, which is never observed to be agitated. For the safety of vessels bound to Livonia, two square beacons have been erected on the coast, near Domefnefs church, opposite to the sand bank, and facing each other. One of these is twelve fathoms high, and the other eight; and a large fire is kept burning on them from the first of August to the first of January. When the mariners see these fires appear as one in a direct line, they may conclude that they are clear of the extremity of the sand bank, and consequently out of danger; but if they see both beacons, they are in danger of running upon it. The district of Pilten contains seven parishes, but no towns worthy of notice. The inhabitants are chiefly of the Lutheran persuasion.

PILUM, a missile weapon used by the Roman soldiers, and in a charge darted upon the enemy. Its point, we are told by Polybius, was so long and small, that after the first discharge it was generally so bent as to be rendered useless. The legionary soldiers made use of the pilum, and each man carried two. The pilum underwent many alterations and improvements, inasmuch that it is impossible with any precision to describe it. Julius Scaliger laboured much to give an accurate account of it, and would have esteemed success on this head amongst the greatest blessings of his life. This weapon appears, however, to have been sometimes round, but most commonly square, to have been two cubits long in the staff, and to have had an iron point of the same length hooked and jagged at the end. Marius made a material improvement in it; for during the Cimbrian war, he so contrived it, that when it stuck in the enemies shield it should bend down in an angle in the part where the wood was connected with the iron, and thus become useless to the person who received it.

PIMENTO, or, as Mr Edward writes, PIEMENTO, in botany, or JAMAICA PEPPER, or *Allspice*, a species of the myrtus. See MYRTUS.

"The pimento trees grow spontaneously, and in great abundance, in many parts of Jamaica, but more particularly on hilly situations near the sea, on the northern side of that island; where they form the most delicious groves that can possibly be imagined; filling the air with fragrance, and giving reality, tho' in a very distant part of the globe, to our great poet's description of those balmy gales which convey to the delighted voyager

'Sabeian odours from the spicy shore

'Of Araby the blest.

'Chear'd with the grateful smell, old ocean smiles.'

"This tree is purely a child of nature, and seems to mock all the labours of man in his endeavours to extend or improve its growth: not one attempt in fifty to propagate the young plants, or to raise them from the seeds, in parts of the country where it is not found

growing spontaneously, having succeeded. The usual method of forming a new pimento plantation (in Jamaica it is called a *walk*) is nothing more than to appropriate a piece of woodland, in the neighbourhood of a plantation already existing, or in a country where the scattered trees are found in a native state, the woods of which being fallen, the trees are suffered to remain on the ground till they become rotten and perish. In the course of twelve months after the first season, abundance of young pimento plants will be found growing vigorously in all parts of the land, being without doubt produced from ripe berries scattered there by the birds, while the fallen trees, &c. afford them both shelter and shade. At the end of two years it will be proper to give the land a thorough cleansing, leaving such only of the pimento trees as have a good appearance, which will then soon form such groves as those I have described, and, except perhaps for the first four or five years, require very little attention afterwards.

"Soon after the trees are in blossom, the berries become fit for gathering; the fruit not being suffered to ripen on the tree, as the pulp in that state, being moist and glutinous, is difficult to cure, and when dry becomes black and tasteless. It is impossible, however, to prevent some of the ripe berries from mixing with the rest; but if the proportion of them be great, the price of the commodity is considerably injured.

"It is gathered by the hand; one labourer on the tree, employed in gathering the small branches, will give employment to three below (who are generally women and children) in picking the berries; and an industrious picker will fill a bag of 70 lbs. in the day.

"The returns from a pimento walk in a favourable season are prodigious. A single tree has been known to yield 150 lbs. of the raw fruit, or one cwt. of the dried spice; there being commonly a loss in weight of one third in curing; but this, like many other of the minor productions, is exceedingly uncertain, and perhaps a very plenteous crop occurs but once in five years."

PIMPINELLA, BURNET SAXIFRAGE; a genus of the digynia order, belonging to the pentandria class of plants. There are seven species; the most remarkable of which are, 1. The major, or greater burnet saxifrage, growing naturally in chalky woods, and on the sides of the banks near hedges, in several parts of England. The lower leaves of this sort are winged; the lobes are deeply sawed on their edges, and sit close to the midrib, of a dark green. The stalks are more than a foot high, dividing into four or five branches. The lower part of the stalk is garnished with winged leaves, shaped like those at the bottom, but smaller: those upon the branches are short and trifid; the branches are terminated by small umbels of white flowers, which are composed of smaller umbels or rays. The flowers have five heart-shaped petals, which turn inward, and are succeeded by two narrow, oblong, channelled seeds. 2. The anisum, or common anise, is an annual plant, which grows naturally in Egypt; but is cultivated in Malta and Spain, from whence the seeds are annually imported into Britain. The lower leaves of this plant are divided into three lobes, which are deeply cut on their edges; the stalk rises a foot and a half high, dividing into several slender branches, garnished with narrow

Pimento,
Pimpinella.

Pimpinella

Pin.

narrow leaves, cut into three or four narrow segments, terminated by pretty large loose umbels, composed of smaller umbels or rays, which stand on pretty long footstalks. The flowers are small, and of a yellowish white; the seeds are oblong and swelling.—The former species requires no culture; the latter is too tender to be cultivated for profit in this country. However, the seeds will come up if sown in the beginning of April upon a warm border. When they come up, they should be thinned, and kept clear of weeds, which is all the culture they require.

Uses. Both these species are used in medicine. The roots of pimpinella have a grateful, warm, very pungent taste, which is entirely extracted by rectified spirit: in distillation the menstruum arises, leaving all that it had taken up from the root united into a pungent aromatic resin. This root promises, from its sensible qualities, to be a medicine of considerable utility, though little regarded in common practice: the only officinal composition in which it is an ingredient is the *pulvis ari compositus*. Stahl, Hoffman, and other German physicians, are extremely fond of it; and recommend it as an excellent stomachic, resolvent, detergent, diuretic, diaphoretic, and alexipharmac. They frequently gave it, and not without success, in scorbutic and cutaneous disorders, foulness of the blood and juices, tumors and obstructions of the glands, and diseases proceeding from a deficiency of the fluid secretions in general. Boerhaave directs the use of this medicine in asthmatic and hydropic cases, where the strongest resolvers are indicated: the form he prefers is a watery infusion; but the spirituous tincture possesses the virtues of the root in much greater perfection.

Aniseeds have an aromatic smell, and a pleasant warm taste, accompanied with a degree of sweetness. Water extracts very little of their flavour; rectified spirit the whole.

These seeds are in the number of the four greater hot seeds: their principal use is in cold flatulent disorders, where tenacious phlegm abounds, and in the gripes to which young children are subject. Frederic Hoffman strongly recommends them in weakness of the stomach, diarrhoeas, and for strengthening the tone of the viscera in general; and thinks they well deserve the appellation given them by Helmont, *intestinorum solamen*. The smaller kind of aniseeds brought from Spain are preferred.

PIMPLE, in medicine, a small pustule arising on the face. By mixing equal quantities of the juice of house-leek, *sedum minus*, passed through paper, and of spirit of wine rectified by itself, a white coagulum of a very volatile nature is formed, which Dr Bughart commends for curing pimples of the face; and says, that the thin liquor separated from it with sugarcandy is an excellent remedy for thick viscid phlegm in the breast.

PIN, in commerce, a little necessary instrument made of brass-wire, chiefly used by women in adjusting their dress.

In the year 1543, by statute 34 and 35 of Henry VIII. cap. vi. it was enacted, "That no person shall put to sale any pinnes but only such as shall be double-headed, and have the heads soldered fast to the shank of the pins, well smoothed, the shank well-sha-

pen, the points well and round filed, cauted, and sharpened." From the above extract it should appear that the art of pin-making was but of late invention, probably introduced from France; and that our manufactories since that period have wonderfully improved.

Though pins are apparently simple, their manufacture is, however, not a little curious and complex. We shall therefore give our readers an account of it from Ellis's *Campagna* of London.

"When the brass-wire, of which the pins are formed, is first received at the manufactory, it is generally too thick for the purpose of being cut into pins. The first operation therefore is that of winding it off from one wheel to another with great velocity, and causing it to pass between the two, through a circle in a piece of iron of smaller diameter: the wire being thus reduced to its proper dimensions, is straitened by drawing it between iron pins, fixed in a board in a zig-zag manner, but so as to leave a straight line between them: afterwards it is cut into lengths of three or four yards, and then into smaller ones, every length being sufficient to make six pins; each end of these is ground to a point, which was performed when I viewed the manufactory by boys who sat each with two small grinding stones before him, turned by a wheel. Taking up a handful, he applies the ends to the coarsest of the two stones, being careful at the same time to keep each piece moving round between his fingers, so that the points may not become flat: he then gives them a smoother and sharper point, by applying them to the other stone, and by that means a lad of 12 or 14 years of age is enabled to point about 16,000 pins in an hour. When the wire is thus pointed, a pin is taken off from each end, and this is repeated till it is cut into six pieces. The next operation is that of forming the heads, or, as they term it, *head-spinning*; which is done by means of a spinning-wheel, one piece of wire being thus with astonishing rapidity wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions: it is then cut with sheers; every two circumvolutions or turns of the wire forming one head; these are softened by throwing them into iron pans, and placing them in a furnace till they are red-hot. As soon as they are cold, they are distributed to children, who sit with anvils and hammers before them, which they work with their feet, by means of a lathe, and taking up one of the lengths, they thrust the blunt end into a quantity of the heads which lie before them, and catching one at the extremity, they apply them immediately to the anvil and hammer, and by a motion or two of the foot, the point and the head are fixed together in much less time than it can be described, and with a dexterity only to be acquired by practice; the spectator being in continual apprehension for the safety of their fingers ends. The pin is now finished as to its form, but still it is merely brass; it is therefore thrown into a copper, containing a solution of tin and the leys of wine. Here it remains for some time; and when taken out assumes a white though dull appearance: in order therefore to give it a polish, it is put into a tub containing a quantity of bran, which is set in motion by turning a shaft that runs through its centre, and thus by means of friction it becomes perfectly bright. The

Pin.

Pinacia
||
Pindar.

pin being complete, nothing remains but to separate it from the bran, which is performed by a mode exactly similar to the winnowing of corn; the bran flying off and leaving the pin behind fit for immediate sale. I was the more pleased with this manufactory, as it appeared to afford employment to a number of children of both sexes, who are thus not only prevented from acquiring the habits of idleness and vice, but are on the contrary initiated in their early years in those of a beneficial and virtuous industry." See NEEDLES.

PINACIA, among the Athenians, were tablets of brass inscribed with the names of all those citizens in each tribe who were duly qualified and willing to be judges of the court of Areopagus. These tablets were cast into a vessel provided for the purpose, and the same number of beans, an hundred being white and all the rest black, were thrown into another. Then the names of the candidates and the beans were drawn out one by one, and they whose names were drawn out together with the white beans were elected judges or senators. In Solon's time there were only four tribes, each of which chose 100 senators; but the number of tribes afterwards increasing, the number of senators or judges increased to so many hundreds more.

PINANG, the Chinese name of the *Areca Catechu*, Lin. See ARECA.

PINCHBECK. See ZINC.

PINDAR, the prince of lyric poets, was born at Thebes, about 520 years B. C. He received his first musical instructions from his father, who was a flute-player by profession; after which, according to Suidas, he was placed under Myrtis, a lady of distinguished abilities in lyric poetry. It was during this period that he became acquainted with the poetess Corinna, who was likewise a student under Myrtis. Plutarch tells us, that Pindar profited from the lessons which Corinna, more advanced in her studies, gave him at this school. It is very natural to suppose, that the first poetical effusions of a genius so full of fire and imagination as that of Pindar would be wild and luxuriant; and Lucian has preserved six verses, said to have been the exordium of his first essay; in which he crowded almost all the subjects for song which ancient history and mythology then furnished. Upon communicating this attempt to Corinna, she told him smiling, that he should sow with the hand, and not empty his whole sack at once. Pindar, however, soon quitted the leading strings of these ladies, his poetical nurses, and became the disciple of Simonides, now arrived at extreme old age: after which he soon surpassed all his masters, and acquired great reputation over all Greece: but, like a true prophet, he was less honoured in his own country than elsewhere; for at Thebes he was frequently pronounced to be vanquished, in the musical and poetical contests, by candidates of inferior merit.

The custom of having these public trials of skill in all the great cities of Greece was now so prevalent,

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that but little fame was to be acquired by a musician or poet any other way than by entering the lists; and we find, that both Myrtis and Corinna publicly disputed the prize with him at Thebes. He obtained a victory over Myrtis, but was vanquished five different times by Corinna. The judges, upon occasions like these, have been frequently accused of partiality or ignorance, not only by the vanquished, but by posterity: and if the merit of Pindar was pronounced inferior to that of Corinna five several times, it was, says Pausanias, because the judges were more sensible to the charms of beauty than to those of music and poetry (A). Was it not strange, said the Scythian Anacharsis, that the Grecian artists were never judged by artists, their peers?

Pindar, before he quitted Thebes, had the vexation to see his Dithyrambics traduced, abused, and turned into ridicule, by the comic poets of his time; and Athenæus tells us, that he was severely censured by his brother lyrics, for being a lipogrammatist, and composing an ode from which he had excommunicated the letter S. Whether these censures proceeded from envy or contempt cannot now be determined; but they were certainly useful to Pindar, and it was necessary that he should be lashed for such puerilities. Thebes seems to have been the purgatory of our young bard: when he quitted that city, as his judgment was matured, he avoided most of the errors for which he had been chastised, and suddenly became the wonder and delight of all Greece. Every hero, prince, and potentate, desirous of lasting fame, courted the muse of Pindar.

He seems frequently to have been present at the four great festivals, of the Olympian, Pythian, Nemean, and Isthmian games, as may be inferred from several circumstances and expressions in the odes which he composed for the victors in them all. Those at Olympia, who were ambitious of having their achievements celebrated by Pindar, applied to him for an ode, which was first sung in the Prytaneum or town-hall of Olympia, where there was a banqueting room, set apart for the entertainment of the conquerors. Here the ode was rehearsed by a chorus, accompanied by instruments. It was afterwards performed in the same manner at the triumphal entry of the victor into his own country, in processions, or at the sacrifices that were made with great pomp and solemnity on the occasion.

Pindar, in his second Isthmian ode, has apologized for the mercenary custom among poets, of receiving money for their compositions. "The world (says he) is grown interested, and thinks in general with the Spartan philosopher Aristodemus, that *money only makes the man*: a truth which this sage himself experienced, having with his riches lost all his friends." It is supposed that Pindar here alludes to the avarice of Simonides, who first allowed his muse to sell her favours to the highest bidder.

5 C

There

(A) Pausanias says, that Corinna was one of the most beautiful women of her time, as he judged by a picture of her which he saw at Tanagris at the place where the public exercises were performed. She was represented with her head ornamented by a riband as a memorial of the victories she had obtained over Pindar at Thebes.

Pindar.

There is no great poet in antiquity whose moral character has been less censured than that of Pindar. Plutarch has preserved a single verse of his *Epicidium* or *Dirge* that was sung at his funeral; which, short and simple as it is, implies great praise: *This man was pleasing to strangers, and dear to his fellow-citizens.* His works abound with precepts of the purest morality: and it does not appear that he ever traduced even his enemies; comforting himself, for their malignity, by a maxim which he inserted in his first *Pythic*, and which afterwards became proverbial, *That it is better to be envied than pitied.*

Pausanias says, that the character of poet was truly consecrated, in the person of Pindar, by the god of verse himself; who was pleased, by an express oracle, to order the inhabitants of Delphos to set apart for Pindar one half of the first-fruit offerings brought by the religious to his shrine, and to allow him a conspicuous place in his temple, where in an iron chair he used to sit and sing his hymns in honour of that god. This chair was remaining in the time of Pausanias, several centuries after, and shown to him as a relic not unworthy of the sanctity and magnificence of that place.

But though Pindar's muse was pensioned at Delphos, and well paid by princes and potentates elsewhere, she seems, however, sometimes to have sung the spontaneous strains of pure friendship. Of this kind were, probably, the verses bestowed upon the musician Midas, of Agrigentum in Sicily, who had twice obtained the palm of victory by his performance on the flute at the Pythic games (B). It is in his 12th Pythic ode that Pindar celebrates the victory of Midas over all Greece, upon that instrument which Minerva herself had invented (C).

Fabricius tells us, that Pindar lived to the age of 90; and, according to the chronology of Dr Blair, he died 435 years B. C. aged 86. His fellow-citizens erected a monument to him in the Hippodrome at Thebes, which was still subsisting in the time of Pausanias; and his renown was so great after his death, that his posterity derived very considerable honours and privileges from it. When Alexander the Great attacked the city of Thebes, he gave express orders to his soldiers to spare the house and family of Pindar. The Lacedæmonians had done the same before this period; for when they ravaged Bœotia and burned the capital, the following words were written upon the door of the poet: *Forbear to burn this house, it was the dwelling of Pindar.* Respect for the memory of this great poet continued so long, that, even in Plutarch's time, the best part of the sacred victim at the Theoxenian festival was appropriated to his descendants.

PINDARIC ODE, in poetry, an ode formed in imitation of the manner of Pindar. See POETRY, n^o 136, &c.

PINDUS (anc. geog.), not a single mountain, but a chain of mountains, inhabited by different people of Epirus and Thessaly; separating Macedonia, Thessaly, and Epirus: An extensive chain, having Macedonia to the north, the Perrhæbi to the west, the Dolopes to the south, and the mountain itself of Thessaly (Strabo).

PINDUS, a Doric city of Ætolia, situated on the cognominal river, which falls into the Cephissus (Strabo).

PINE, in botany. See PINUS.

PINE-Apple. See BROMELIA.

PINEA, or PIGNE, in commerce, is a term used in Peru and Chili, for a kind of light, porous masses, or lumps, formed of a mixture of mercury and silver-dust from the mines. The ore, or mineral, of silver, when dug out of the veins of the mine, is first broken and then ground in mills for the purpose, driven by water with iron pestles, each of 200 pounds weight. The mineral, when thus pulverized, is next sifted, and then worked up with water into a paste; which, when half dry, is cut into pieces, called *cuerpos*, a foot long, weighing each about two thousand five hundred pounds.

Each piece or cuerpo is again kneaded up with sea-salt, which, dissolving, incorporates with it. They then add mercury, from 10 to 20 pounds for each cuerpo, kneading the paste afresh until the mercury be incorporated therewith. This office, which is exceedingly dangerous on account of the noxious qualities of the mercury, is always made the lot of the poor Indians. This amalgamation is continued for eight or nine days; and some add lime, lead, or tin ore, &c. to forward it; and, in some mines, they are obliged to use fire. To try whether or no the mixture and amalgamation be sufficient, they wash a piece in water; and if the mercury be white, it is a proof that it has had its effect; if black, it must be still farther worked. When finished, it is sent to the lavatories, which are large basons that empty successively into one another. The paste, &c. being laid in the uppermost of these, the earth is then washed from it into the rest by a rivulet turned upon it; an Indian, all the while, stirring it with his feet, and two other Indians doing the like in the other basons. When the water runs quite clear out of the basons, the mercury and silver are found at bottom incorporated. This matter they call *pella*, and of this they form the pineas, by expressing as much of the mercury as they can; first, by putting it in woollen bags, and pressing and beating it strongly; then, by stamping it in a kind of wooden mould, of an octagonal form, at bottom whereof is a brass plate pierced

(B) This Midas is a very different personage from his long-eared majesty of Phrygia, whose decision in favour of Pan had given such offence to Apollo; as is manifest, indeed, from his having been cotemporary with Pindar.

(C) The most extraordinary part of this musician's performance that can be gathered from the scholiast upon Pindar, was his finishing the solo, without a reed or mouth-piece, which broke accidentally while he was playing. The legendary account given by the poet in this ode, of the occasion upon which the flute was invented by Minerva, is diverting: "It was (says he) to imitate the howling of the Gorgons, and the hissing of their snakes, which the goddess had heard when the head of Medusa (one of these three anti-graces) was cut off by Perseus."

Pineal
Gland,
Pineau

pierced full of little holes. The matter, when taken out of the mould, is laid on a trivet, under which is a large vessel full of water; and the whole being covered with an earthen head, a fire is made around it.

The mercury still remains in the mass and is thus reduced into fumes, and, at length condensing, it is precipitated into the water, leaving behind it a mass of silver grains of different figures, which, only joining or touching at the extremes, render the matter very porous and light. This, therefore, is the pinea, or pigne, which the workmen endeavour to sell secretly to vessels trading to the South sea; and from which those, who have ventured to engage in so dangerous a commerce, have made such vast gains. Indeed the traders herein must be very careful; for the Spanish miners are arrant knaves, and to make the pignes weigh the more, they often fill the middle with sand or iron.

PINEAL GLAND. See ANATOMY.

PINEAU (Severin du), who died at Paris in 1619, was a native of Chartres, and first surgeon to the king of France. He was very skilful in lithotomy; and has left behind him, 1. A Discourse concerning the Extraction of the Stone in the Bladder, published in 1610 in 8vo. 2. A treatise *De Virginitatis Notis*, printed at Leyden 1641, in 12mo. This last performance, however useful it may be to men of science, we would not venture to recommend to the perusal of young people, on account of some particulars which it was perhaps unnecessary to expose to the eyes of the public.

PINEAU (Gabriel du), was born at Angers in 1573, where he followed the profession of a lawyer with a reputation above his years. He went afterwards to Paris, and pled with éclat before the parliament and great council. Upon his return to Angers, he became a counsellor in the presidial court. He was consulted by all the neighbouring provinces, and had an active hand in all the great affairs of his time. Mary de Medicis conferred upon him the office of master of requests, and in her disgrace wished to support herself by his credit and counsels; but Du Pineau, always attentive to what he owed on the one hand to the mother of his king, and on the other to the king himself, never ceased to inspire that princess with sentiments of peace.

In 1632 Louis XIII. by way of reward, appointed him mayor and captain-general of the city of Angers; a situation in which he merited the flattering title of *Father of the People*. He had no respect of persons; for he was equally accessible to the poor and the great. This worthy citizen died the 15th of October 1644, at the age of 71. His house was a kind of academy, where regular conferences were held, and attended by young officers, advocates, and other literary characters. In those conferences every one freely stated the difficulties which occurred to him upon subjects either of law or history; and when Pineau spoke, all was made clear; but he was always the last in delivering his sentiments, because he perceived that too much deference was paid to his opinion. His writings are, 1. Latin notes, in addition to those of Du Moulin, upon the canon law, and printed along with the works of that eminent lawyer by the care of Francis Pinson. 2. Commentaries, observations, and consultations, upon several important questions respecting the laws both of An-

jou and of France, with some dissertations upon different subjects, &c. reprinted in 1725 in 2 vol. fol. by the care of Livoniere, who has enriched them with very useful remarks. The editor says, that "Du Pineau is a little inferior to the celebrated Du Moulin on the civil law, but that he is more accurate than the other upon the canon law."—Menage made these two verses upon his death:

*Pinellus perit, Themidis pius ille sacerdos,
In proprio judex limine perpetuus.*

PINEDA (John), who was born at Seville of a noble family, entered into the society of Jesuits in 1572. He taught philosophy and divinity in several colleges; and devoted his time to the study of the Holy Scriptures. That he might render that study the easier, he made himself master of the oriental languages. We have of his writings, 1. Two volumes of Commentaries upon the book of Job, in folio. 2. Two upon Ecclesiastes. 3. A General History of the Church, in Spanish, 4 vol. in folio. 4. A History of Ferdinand III. in the same language, in folio. He died in 1637, much regretted by the members of his society, and by the public in general.

PINELLI (John-Vincent), born at Naples, was son of Count Pinelli, a noble Genoese, who had settled in that city, and had acquired a handsome fortune in the way of trade. After receiving a liberal education he quitted the place of his nativity, and repaired to Padua, where he took up his residence at the age of 24. Being a great lover of science, he gave a preference to that city on account of its famous university, which brought to it a number of learned men. He had an excellent library, which consisted of a choice collection of books and manuscripts, and which he continued to enrich till the hour of his death. His literary correspondence, not only in Italy, but through the most of Europe, procured him all the new works which were worthy of a place in his collection. The authors themselves were often forward to pay their respects to him. In many cities of Italy he had persons employed to search, at least once a month, the stalls of those artificers who make use of old parchments, such as lute-makers, sieve-wrights, and others; and by this means he had the good fortune often to save from destruction some valuable fragments. His passion for knowledge embraced all the sciences; but history, medals, antiquities, natural history, and particularly botany, were his favourite studies. He was consulted from all quarters, and the extent of his acquaintance with the learned world was very great. He corresponded with Justice Lipsius, Joseph Scaliger, Sigonius, Possevin, Peter Pithou, and a great many others, who have all paid the highest compliments to his erudition. Insensible to all the pleasures of life, and acquainted only with those of the mind, he had a great dislike to plays, entertainments, shows, and every thing which most excites the curiosity of other men. During the space of 43 years that he lived at Padua, he was never known to be out of the city but twice; once on occasion of a plague which infested it; and afterwards on a voyage to Naples, which he made at the earnest solicitation of his friends. In short, Pinelli was generous, sympathizing, and compassionate, particularly to men of letters, whose wants he often anticipated. His zeal

Pineda,
Pinelli.

Pinet
||
Pinguicula.

for the progress and advancement of science rendered him very communicative of his knowledge and of his books; but this was always done with judgment and discretion. He died in 1601, aged 68, without having published any work. Paul Gualdo, who has written Pinelli's life, does not specify the number of volumes of which his rich library consisted: he only informs us, that when it was transported by sea to Naples, it was packed up in 130 chests, of which 14 contained manuscripts; but it did not go wholly to his heirs. The senate of Venice caused their seal to be set upon the manuscripts, and took away whatever concerned the affairs of the republic, to the number of 200 pieces.—“I compare (says President de Thou) Pinelli to Titus Pomponius; for, as that illustrious Roman was called *Attick*, Pinelli also bore the title of *Venetian*, on account of the great affection which the republic of Venice had for him.

PINET (Antony du), lord of Noroy, lived in the 16th century, and was a native of Besançon. He was strongly attached to the Protestant religion, and a bitter enemy to the church of Rome. His book, intitled *La Conformité des Eglises Reformées de France*, and *de l'Eglise primitive*, printed at Lyons, 1564, in 8vo; and the notes which he added to the French translation of the Fees of the Pope's Chancery, which was printed at Lyons, in 8vo, 1564, and reprinted at Amsterdam in 1700, in 12mo, plainly discover his sentiments. He published the last mentioned performance under this title: *Taxe des parties casuelles de la boutique du Pape*, in Latin and French, with some notes taken from decrees, councils, and canons, in order to ascertain the discipline anciently observed in the church. In the epistle dedicatory, he assumes the tone of a declared enemy to the court of Rome. He apologizes for having presented this book “to a society so holy as yours (the Protestants), in which are heard only hymns, psalms, and praises, to the Lord our God: but it is proper to show to the villain his villany, and the fool his folly, lest one should be thought to resemble them.” We see by this specimen, that Pinet had no more politeness in his style than in his manners. His translation of Pliny's Natural History, printed at Lyons, in 2 vol. folio, 1566, and at Paris, 1608, was formerly much read. Though there are a good many errors in it, it is yet very useful at present, especially for those who understand Pliny's Latin, on account of the translator's researches, and a great number of marginal notes. Pinet also published Plans of the principal fortresses in the world at Lyons, 1564, in folio.

Grofier's
General Description of
China, vol. i.
p. 92.

PING-LEANG FOU, a city of China in the Province of Chen-si. It is one of the most considerable cities of the western part of the province, and is situated on the river Kin-ho. The air here is mild; and the agreeable views which the surrounding mountains present, added to the streams which water the country, render it a very delightful residence. It has under its jurisdiction three cities of the second class and seven of the third. In this district is a valley so deep and narrow, that it is almost impervious to the light: a large highway, paved with square stones, runs through it.

PINGUICULA, BUTTERWORT; a genus of the monogynia order, belonging to the diandria class of plants. There are four species; of which the most re-

markable is the vulgaris, or common butterwort, growing commonly on bogs or low moist grounds in England and Scotland. Its leaves are covered with soft, upright pellucid prickles, secreting a glutinous liquor. The flowers are pale red, purple, or deep violet colour, and hairy within. If the fresh gathered leaves of this plant are put into the strainer through which warm milk from the cow is poured, and the milk set by for a day or two to become aced, it acquires a consistency and tenacity, and neither whey nor cream separate from it. In this state it is an extremely grateful food, and as such is used by the inhabitants of the north of Sweden. There is no further occasion to have recourse to the leaves; for half a spoonful of this prepared milk, mixed with fresh warm milk, will convert it to its own nature, and this again will change another quantity of fresh milk, and so on without end. The juice of the leaves kills lice; and the common people use it to cure the cracks or chops in cows' udders. The plant is generally supposed injurious to sheep, by occasioning in them that disease called the rot. But from experiments made on purpose, and conducted with accuracy, it appears, that neither sheep, cows, goats, horses, or swine, will feed upon this plant.

Wherever this plant, called also *Yorkshire sanicle*, is found, it is a certain indication of a boggy soil. From the idea that the country people have of its noxious operation on sheep, this plant has been called the *white rot*; since as they imagine it gives them the rot whenever they eat it, which they will not do but from great necessity.

The Laplanders, like the Swedes with the milk of cows, receive that of the rein-deer upon the fresh leaves of this plant, which they immediately strain off and set aside till it becomes somewhat aced; and the whole acquires in a day or two the consistence of cream without separating the serum, and thus becomes an agreeable food. When thus prepared, a small quantity of the same has the property of rennet in producing the like change on fresh milk.

PINGUIN, or PENGUIN, in ornithology, a genus of birds of the order of palmipedes; distinguished by Mr Latham by the following characters. The bill is strong, straight, more or less bending towards the point, and furrowed on the sides; the nostrils are linear, and placed in the furrows; the tongue is covered with strong spines, pointing backwards; the wings are small, very like fins, and covered with no longer feathers than the rest of the body, and are useless in flight; the body is clothed with thick short feathers, having broad shafts, and placed as compactly as the scales of fishes; the legs are short, thick, and placed very near the vent; the toes are four, and are all placed forwards, the interior are loose, and the rest are webbed; the tail is very stiff, consisting of broad shafts scarcely webbed.

It is agreed that Pinguins are inhabitants of southern latitudes only; being, as far as is yet known, found only on the coasts of South America from Port Desire to the Straits of Magellan; and Frezier says they are found on the western shore as high as Conception. In Africa they seem to be unknown, except on a small isle near the Cape of Good Hope, which takes its name from them. They are found in vast numbers on land during the breeding season; for they seldom come on shore but at that time: they form burrows under

ground

Penguin. ground like rabbits; and the isles they frequent are perfectly undermined by them.

Their attitude on land is quite erect, and on that account they have been compared by some to pygmies, by others to children with white bits. They are very tame, and may be driven like a flock of sheep. In water they are remarkably active, and swim with vast strength, assisted by their wings, which serve instead of fins. Their food in general is fish; not but that they will eat grass like geese.

Mr Latham remarks, that this genus appears to hold the same place in the southern division of the earth that theawks do in the northern; and that, however authors may differ in opinion on this head, they ought not to be confounded with one another. The penguin is never seen but in the temperate and frigid zones south of the equator, while theawk only appears on the parallel latitudes north of the equator; for neither of these genera have yet been observed within the tropics. Forster, in his voyage (vol. i. page 92.), says, he saw one for the first time in lat. 48. south, nor are they ever met with nearer than 40 degrees south. *Id. Introd. Disc. on Penguins, Comment. Got. vol. 3d.*

The wings of the penguin are scarcely any thing else than mere fins, while theawk has real wings and gills, though they be but small. The former has four toes on each foot, the latter only three. While swimming, the penguin sinks wholly above the breast, the head and neck only appearing out of the water; while theawk, like most other birds, swims on the surface. There are several other peculiarities which serve to distinguish the two genera, but what we have mentioned are doubtless sufficient.

*Latham's
Synopsis.*

"The bodies of the penguin tribe (says our author) are commonly so well and closely covered with feathers that no wet can penetrate; and as they are in general excessively fat, these circumstances united secure them from cold. They have often been found above 700 leagues from land; and frequently on the mountains of ice, on which they seem to ascend without difficulty, as the soles of their feet are very rough and suited to the purpose." Mr Latham enumerates nine different species of this genus, besides two varieties of the black-footed penguin or diomedea.

1. The first, which is a very beautiful species, our author calls the *crested penguin*. The birds of this species are 23 inches long; the bill is three inches long, and of a red colour, with a dark furrow running along on each side to the tip; the upper mandible is curved at the end, the under is obtuse; the irides are of a dull red; the head, neck, back, and sides are black. Over each eye there is a stripe of pale yellow feathers, which lengthens into a crest behind, nearly four inches long; the feathers on each side of the head, above this stripe, are longer than the rest, and stand upward, while those of the crest are decumbent, but can be erected on each side at pleasure; the wings, or rather fins, are black on the outside, edged with white; on the inside they are white; the breast and all the under parts are also white; the legs are orange, and the claws are dusky. The female has a streak of pale yellow over the eye, but it is not prolonged into a crest behind as in the male.

This species inhabits Falkland's Islands, and was likewise met with in Kerguelen's Land, or Isle of Deso-

lation, as well as at Van Diemen's Land, and New Holland, particularly in Adventure Bay. They are called *hopping penguins* and *jumping jacks*, from their action of leaping quite out of the water, on meeting with the least obstacle, for three or four feet at least; and indeed, without any seeming cause they often do the same, appearing chiefly to advance by that means. This species seems to have a greater air of liveliness in its countenance than others, yet is in fact a very stupid bird, so much so as to suffer itself to be knocked on the head with a stick when on land. Forster says he found them difficult to kill, and when provoked, he adds, they ran at the sailors in flocks, and pecked their legs, and spoiled their clothes. When angered too they erect their crests in a beautiful manner. These birds make their nests among those of the pelican tribe, living in tolerable harmony with them; and lay seldom more than one egg, which is white, and larger than that of a duck. They are mostly seen by themselves, seldom mixing with other penguins, and often met with in great numbers on the outer shores, where they have been bred. They are frequently so regardless as to suffer themselves to be taken by the hand. The females of this species lay their eggs in burrows, which they easily form of themselves with their bills, throwing out the dirt with their feet. In these holes the eggs are deposited on the bare earth. The general time of sitting is in October; but some of the species, especially in the colder parts, do not sit till December, or even January. How long they sit is not known.

2. The second species mentioned by Latham is the *patagonian*. It is distinguished by this name not only because it is found on that coast, but also because it exceeds in bulk the common penguins as much as the natives are said to do the common race of men. It was first discovered by Captain Macbride, who brought one of them from Falkland Islands off the Straits of Magellan. The length of the stuffed skin of this particular bird measured four feet three inches, and the bulk of the body seemed to exceed that of a swan. The bill was four inches and a half long, slender, straight, bending on the end of the upper mandible, with no nostrils. The tongue half the length of the bill, and singularly armed with strong sharp spikes pointing backwards. The plumage is most remarkable, the feathers lying over one another with the compactness of the scales of a fish; their texture equally extraordinary; the shafts broad and very thin; the vanes unwebbed; the head, throat, and hind part of the neck, are of a deep brown colour; from each side of the head to the middle of the fore part of the neck are two lines of bright yellow, broad above, narrow beneath, and uniting half way down; from thence the same colour widens towards the breast, fading away till it is lost in pure white, of which colour is the whole under side of the body, a dusky line dividing it from the colour of the upper part. The whole back is of a very deep ash-colour, almost dusky; but the end of each feather is marked with a blue spot, those about the junction of the wings larger and paler than the others. The wings are in this species, as in all the others, extremely short in respect to the size of the bird; hang down, and have the appearance of fins, whose office they perform; their length is only 14 inches; on the outside they are dusky, and covered

Plate
CCCXCVI.

Penguin.

vered with scale-like feathers, or at best, with such whose shafts are so broad and flat as scarce to be distinguished from scales; those on the ridge of the wings consisting entirely of shaft; the larger, or quill feathers, have some very short webs. The tail consists of 30 brown feathers, or rather thin shafts, resembling split whale-bone; flat on the upper side, concave on the under, and the webs short, unconnected, and bristly. From the knees to the end of the claws six inches, covered with strong pentangular black scales; the fore toe scarce an inch long, and the others so remarkably short, as to evince the necessity of that strength of the tail, which seems intended as a support to the bird in its erect attitude; in the same manner as that of the woodpecker is when it clings to the sides of trees: between the toes is a strong semilunar membrane, continued up even part of the claws; the middle claw is near an inch long, and the inner edge very sharp and thin; the interior toe is small, and placed very high. The skin is extremely tough and thick; which, with the closeness of the feathers, guards it effectually in the element wherein it is so conversant.

This species, which was, as we have seen, first met with in Falkland Islands, has since been seen in Kerguelen's Land, New Georgia, and New Guinea. M. Bougainville caught one, which soon became so tame as to follow and know the person who had care of it: it fed on flesh, fish, and bread; but after a time grew lean, pined away, and died. The chief food, when at large, is thought to be fish; the remains of which, as well as crabs, shell-fish, and molluscs, were found in the stomach. This species is the fattest of the tribe; and therefore most so in January when they moult. They are supposed to lay and sit in October. They are met with in the most deserted places. Their flesh is black, though not very unpalatable. This has been considered as a solitary species, but has now and then been met with in considerable flocks. They are found in the same places as the papuan penguins, and not unfrequently mixed with them; but in general show a disposition of associating with their own species.

3. The third species is denominated *papuan*. It is about $2\frac{1}{2}$ feet long, being a little bigger than that which is called the *Cape Penguin*. This species inhabits the Isle of Papos, or New Guinea; and has been met with at Falkland Isles and Kerguelen's Land; it is often found among the patagonian penguins.

4. The antarctic penguin is about 25 inches long, and weighs about $11\frac{1}{2}$ pounds. The bill is upwards of $2\frac{1}{2}$ inches long; the upper parts of the body are black, the under are glossy white; beneath the chin there is a narrow streak of a blackish colour, passing backward towards the hind head, a little bent about the region of the ears; the wings are much the same as in the other species; the tail is cuneiform; the feathers, or rather bristles, of which it is composed are black and in number 32; the legs are of a flesh colour, and the soles of the feet are black.

"This species (says Latham) inhabits the south sea, from 48 degrees to the antarctic circle; and is frequently found on the ice mountains and islands, on which it ascends; it is a pretty numerous species. Our last voyagers found them in plenty in the Isle of Desolation. And it was observed, that in an island they touched at, not greatly distant, the rocks were almost

covered with penguins and shags; the first most probably of this sort."

5. For the black-footed penguin, or *diomedea demersa*, see *DIOMEDEA*.

6. The magellanic species is about the size of the antarctic penguin. They are about 2 feet and sometimes $2\frac{1}{2}$ feet long, and weigh 11 pounds. The bill is black, having a transverse band across near its tip; the head and neck are black, except a few markings here and there; the upper parts of the body and wings are of the same colour; the under parts of both are white from the breast, except a narrow band of black passing at a little distance within the white on the breast, and downwards on each side, beneath the wings quite to the thighs; the legs are of a reddish colour, irregularly spotted on the thighs; and the claws are black. This species, which is very numerous, inhabits the Straits of Magellan, Staten Land, Terra del Fuego, and Falkland islands. Far from being timid, these birds will often attack a man and peck his legs. As food they are not at all unpalatable. They often mix with sea-wolves among the rushes, burrowing in holes like a fox. They swim with prodigious swiftness. They lay their eggs in collective bodies, resorting in incredible numbers to certain spots, which their long residence has freed from grass, and to which were given the name of towns.—Penrose observes, that they composed their nests of mud, a foot in height, and placed as near one another as may be. It is possible that they may have different ways of nesting, according to the places they inhabit; or perhaps the manners of this may be blended with those of another. "Here, (says he, *i. e.* in the places they frequent), during the breeding season, we were presented with a sight which conveyed a most dreary, and I may say awful, idea of the desertion of these islands by the human species:—a general stillness prevailed in these towns; and whenever we took our walks among them, in order to provide ourselves with eggs, we were regarded indeed with side-long glances, but we carried no terror with us.

"The eggs are rather larger than those of a goose, and laid in pairs. When we took them once, and sometimes twice in a season, they were as often replaced by the birds; but prudence would not permit us to plunder too far, lest a future supply in the next year's brood might be prevented." They lay some time in November, driving away the albatrosses, which have hatched their young in turn before them. The eggs were thought palatable food, and were preserved good for three or four months.

7. The collared penguin is a very little less than the papuan, being 18 inches long. The bill, which is black, is similar to that of the patagonian penguin; the irides are black; the eye is surrounded with a bare skin of a blood colour, of an oval shape, and three times as large as the eye itself; the head, throat, hind part of the neck, and sides, back, wings, and tail, are all black; the fore part of the neck, breast, belly, and thighs, are white, extending round the neck, where the white begins, like a collar, except that it does not quite meet at the back part; the legs are black.

This species inhabits New Guinea. It was also seen by Dr Foster near Kerguelen's Land; and again on two isles adjoining to the island of South Georgia.

8. For

Penguin.

Pinion
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Pinna.

8. For the red-footed pinguin, or phaeton demersus, see PHAETON.

9. The *small*, or, as Latham calls it, the *little pinguin*, is about the size of a teal, being 15 inches long. The bill, which is of a dusky colour, is about $1\frac{1}{2}$ long, and shaped like that of the phaeton demersus; the upper parts of the bird from the head to the tail appear to be of a cinereous blue colour, of which colour are the ends of the feathers; the base of them, however, is brown black, and the shafts of each of the same colour; the under parts from chin to vent are white; the wings are dusky above and white beneath; the tail, which is exceedingly short, consists of 16 stiff feathers, which are scarcely perceptible; the legs are of a dull red colour; the webs are dusky, and the claws are black.

This species is pretty commonly found among the rocks on the southern parts of New Zealand, but they are most frequent at Dusky Bay. They make deep burrows on the sides of the hills, in which they lay their eggs: these holes are so thick in some parts, that a person is scarcely able to walk three or four steps without falling into one of them up to the knees. The inhabitants of Queen Charlotte's Sound kill them with sticks, and, after skinning them, esteem the flesh as good food. They are known at New Zealand by the name of *korora*.—"These birds (says Latham), I have found to vary both in size and colour: some are much smaller than others, quite black above, and measure only 13 inches in length; others are rather larger, and of a plain lead-colour on the upper parts, and the wings black, though all are white, or nearly so, beneath. The legs in these two last are marked with black at the ends of the toes; and the claws are black."

PINION, in mechanics, an arbor, or spindle, in the body whereof are several notches, which catch the teeth of a wheel that serves to turn it round, or it is a lesser wheel that plays in the teeth of a larger.

PINK, a name given to a ship with a very narrow stern; whence all vessels, however small, whose sterns are fashioned in this manner, are called *pink sterned*.

PINK, in botany. See DIANTHUS.

Plate
CCCXCII. PINNA, in zoology; a genus belonging to the order of vermes testacea. See MYTILUS, n° 6. The animal is a slug. The shell is bivalve, fragile, and furnished with a beard; gapes at one end; the valves hinge without a tooth. They inhabit the coasts of Provence, Italy, and the Indian ocean. The largest and most remarkable species inhabits the Mediterranean. It is blind, as are all of the genus; but furnished with very strong calcareous valves. The scuttle-fish (*sepia*), an inhabitant of the same sea, is a deadly foe to this animal: as soon as the pinna opens its shell, he rushes upon her like a lion; and would always devour her, but for another animal whom she protects within her shell, and from whom in return she receives very important services. It is an animal of the crab kind (see CANCER, n° 15.), naked like the hermit, and very quick-sighted. This cancer or crab the pinna receives into her covering; and when she opens her valves in quest of food, lets him out to look for prey. During this the scuttle-fish approaches; the crab returns with the utmost speed and anxiety to his hostess, who being thus warned of the danger shuts her doors, and keeps out the enemy. That very saga-

cious observer Dr Hasselquist, in his voyage towards Palestine, beheld this curious phenomenon, which though well known to the ancients had escaped the moderns. Aristotle (*Hist. lib. 5. c. 15.*) relates, that the pinna kept a guard to watch for her: That there grew to the mouth of the pinna a small animal, having claws, and serving as a caterer, which was like a crab, and was called the *pinnophylax*. Pliny (*lib. 9. 51.*) says, the smallest of all the kinds is called the *pinnoterres*, and therefore liable to injury; this has the prudence to hide itself in the shells of oysters. Again, *lib. 9. 66.* he says, the pinna is of the genus of shell-fish; it is produced in muddy waters, always erect, nor ever without a companion, which some call the *pinnoterres*, others the *pinnophylax*. This sometimes is a small squill, sometimes a crab, that follows the pinna for the sake of food. The pinna, upon opening its shell, exposes itself as a prey to the smallest kind of fishes; for they immediately assault her, and, growing bolder upon finding no resistance, venture in. The guard watching its time gives notice by a bite; upon which the pinna, closing its shell, shuts in, kills, and gives part of whatever happens to be there to its companion.

The pinna and the crab together dwell,
For mutual succour, in one common shell.
They both to gain a livelihood combine;
That takes the prey, when this has given the sign.
From hence this crab, above his fellows fam'd,
By ancient Greeks was *pinnoterres* nam'd.—OPPIAN.

The *pinnæ marinæ* differ less from muscles in the size of their shells than in the fineness and number of certain brown threads which attach them to the rocks, hold them in a fixed situation, secure them from the rolling of the waves, especially in tempests, and assist them in laying hold of slime. See MYTILUS, p. 611. note (a). These threads, says Rondelet, are as fine, compared with those of muscles, as the finest flax is compared with tow. M. de Reaumur says, that these threads are nearly as fine and beautiful as silk from the silk-worm, and hence he calls them the *silk-worms of the sea*. Stuffs, and several kinds of beautiful manufacture, are made of these threads at Palermo; in many places they are the chief object of fishing, and become a silk proper for many purposes. It requires a considerable number of the *pinnæ marinæ* for one pair of stockings. Nothing can equal the delicacy of this singular thread. It is so fine, that a pair of stockings made of it can be easily contained in a snuff-box of an ordinary size. In 1754, a pair of gloves or stockings of these materials was presented to Pope Benedict XIV. which, notwithstanding their extreme fineness, secured the leg both from cold and heat. A robe of the same singular materials was the gift of the Roman emperor to the Satraps of Armenia. See *Procopius de Edif. lib. 3. c. 1.* A great many manufactures are employed in manufacturing these threads into various stuffs at Palermo and other places.

The men who are employed in fishing up the *pinnæ marinæ*, inform us, that it is necessary to break the tuft of threads. They are fished up at Toulon, from the depth of 15, 20, and sometimes more than 30 feet, with an instrument called a cramp. This is a kind of fork of iron, of which the prongs are perpendicular with respect to the handle. Each of them is

Pinna
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Pint.

about eight feet in length, and there is a space between them of about six inches; the length of the handle is in proportion to the depth of the water; the pinnae are seized, separated from the rock, and raised to the surface by means of this instrument. The tuft of silk issues directly from the body of the animal; it comes from the shell at the place where it opens, about four or five inches from the summit or point in the large pinna.

M. de Reaumur, *Mem. de l'Acad. des Sciences*, 1711, page 216, and 1717, page 177, considers the pinna as the most proper of all shell-fish to elucidate the formation of pearls. It produces many of them of different colours, as grey or lead-coloured, red, and some of a blackish colour, and in the form of a pear.

M. d'Argenville distinguishes three kinds of the pinna: 1st, The large kind, which are red within, and which have reddish mother-of-pearl, similar to the substance of the shell itself. There are of those shells which weigh near 15 pounds. This is the *astura* of the Venetians.

2^d, The smaller kind. Some of these are slender, papyraceous, of the colour of horn, a little shaded with pale red.

3^d, The kind called *perna*. These are adorned with points in the channels of their shell; but what is very singular, the edges of the shell are thicker at the openings than at the joining of the valves.

The animal which lodges in the pinna marina rarely shows itself, because the valves are seldom opened. Its head is below, its largest extremity opposite; it is kept in the shell by four vigorous muscles, placed at the extremities of the valves; the shell has no hinges, but a flat and blackish ligament, which is equal in length to one-half of the shell. See PINNOTERUS and PEARL.

PINNACE, a small vessel navigated with oars and sails, and having generally two masts, which are rigged like those of a schooner.

PINNACE is also a boat usually rowed with eight oars. See the article BOAT.

PINNACLE, in architecture, the top or roof of an house, terminating in a point. This kind of roof among the ancients was appropriated to temples; their ordinary roofs were all flat, or made in the platform way.

PINNATED LEAVES, in botany. See BOTANY, p. 445. n° 232.

PINNATIFID, do. p. 442. n° 103.

PINNOTERUS, or PINNOPHYLAX, is a kind of crab-fish, furnished with very good eyes. It is said to be the companion of the pinna marina. They live and lodge together in the same shell, which belongs to the latter. When it has occasion to eat, it opens its valves, and sends out its faithful purveyor to procure food. If during their labour the pinnoterus perceives the polypus, it immediately returns to warn its blind friend of the danger, when, by shutting its valves, it escapes the rage of its enemy; but when the pinnoterus loads itself with booty without molestation, it makes a gentle noise at the opening of the shell, and when admitted the two friends feast on the fruits of its industry. See PINNA, &c.

PINT (*pinta*), a vessel, or measure, used in estimating the quantity of liquids, and even sometimes of

dry things.—Budæus derives the word from the Greek *πιννα*; others from the German *pint*, a little measure of wine; Nicod from the Greek *πινος*, "to drink."

The *English pint* is twofold; the one for wine-measure, the other for beer and ale-measure. See MEASURE.

PINTADA, a species of PROCELLARIA.

PINTLES, certain pints or hooks fastened upon the back part of the rudder, with their points downwards, in order to enter into, and rest upon, the gongings, fixed in the stern-post, to hang the rudder. See HELM.

PINTOR (Peter), born at Valentia in Spain, in the year 1420, was physician to Alexander VI. whom he followed to Rome, where he practised with great success. He has left behind him two performances of considerable merit, 1. *Aggregator Sententiarum Doctorum de Curatione in Pestilentia*, printed at Rome 1499, in folio. 2. *De Morbo Fædo & Occulto his Temporibus Affligenti*, &c. printed at Rome, 1500, in 4to, black letter; a book extremely scarce, unknown to Luifini and Astruc, and which traces the venereal disease to the year 1496. Pintor died at Rome in 1503, aged 83 years.

PINTURICCIO (Bernardino), a celebrated Italian painter, born at Perugia in 1454. He was the disciple of Peter Perugino, under whom he became so good an artist, that he employed him on many occasions as his assistant. He principally painted history and grotesque; but he also excelled in portraits, among which those of pope Pius II. and Innocent VIII. of Giulia Farnese, Cæsar Borgia, and queen Isabella of Spain, are particularly distinguished. The most memorable performance of Pinturiccio is the history of Pius II. painted in ten compartments in the history of Siena; in which undertaking, Raphael, then a young man, and bred under the same master, assisted him so far as to sketch out cartoons of many parts of the composition. The story of his death is worth relating, especially as it illustrates his character. The last work he was engaged in was a *Nativity* for the monastery of St Francis at Siena: the monks accommodated him with a chamber to work in, which they cleared of all the furniture, except one old trunk or chest that appeared too rotten to move; but Pinturiccio, naturally positive and peevish, insisting on its being taken away, the monks, willing to gratify him, complied. It was no sooner stirred than one of the planks bursting, out tumbled 500 pieces of gold, which had been secreted there for many years. The monks were overjoyed at finding this treasure, and the painter proportionably mortified at losing his chance of the discovery by his indiscreet obstinacy: it affected his spirits so much that he survived but a few months, and it was generally considered as the cause of his death.

PINUS, the PINE-TREE; a genus of the monodelphia order, belonging to the monœcia class of plants. The pine-tree was well known to the ancients, and has been described and celebrated both by their philosophers and poets. Pliny enumerates no less than six species of trees of this genus; and it is mentioned by Virgil both in his *Eclogues*, his *Georgics*, and his *Æneid*; by Horace in his *Odes*; by Ovid in his *Metamorphoses*; by Statius; and by Catullus, &c. Macrobius relates a pleasant anecdote concerning the cones of

Pintada
||
Pinus.

Pinus. of pine-trees, which in common language were called *poma pinea*, "pine-apples." There lived in the Augustan age one Vatinius, who by some means had irritated the Roman people so much that they pelted him with stones. When he entertained them with gladiators, to save himself from such treatment for the future, he procured an edict from the ediles, that no person should throw any thing but apples in the amphitheatre. It accidentally happened that at this time Cascellius, eminent for his wit as well as knowledge of the law, was consulted on the question, whether a pine-apple (the cone of the pine) was legally included in the term *pomum*, "an apple?" It is an apple (said he) if you intend to sling it at Vatinius*. A decision by which the edict in his favour did not much mend his situation: for Martial represents it dangerous to come under this tree, because the cones in his time were of so great a size and weight, probably enlarged by cultivation for ages.

* Saturn.
lib. 2.
cap. 6.

Nuces Pineæ.

*Poma sumus Cybeles: procul hinc discede, viator,
Ne cadat in miserum nostra ruina caput †.*

† Lib. 13.
Ep. 25.

There are generally reckoned 14 species of this genus; of which the most remarkable are these following:

1. The *pinæa*, *pinæaster*, or wild pine, grows naturally on the mountains in Italy and the south of France. It grows to the size of a large tree; the branches extend to a considerable distance; and while the trees are young, they are fully garnished with leaves, especially where they are not so close as to exclude the air from those within; but as they advance in age, the branches appear naked, and all those which are situated below become unsightly in a few years; for which reason they are now much less in esteem than formerly.

2. The *pinus pinæa*, or stone pine, is a tall evergreen tree, native of Italy and Spain. It delights in a sandy loam, though like most others it will grow well in almost any land. Respecting the uses of this species, Hanbury tells us that "the kernels are eatable, and by many preferred to almonds. In Italy they are served up at table in their deserts. — They are exceeding wholesome, being good for coughs, colds, consumptions, &c. on which account only this tree deserves to be propagated." Hanbury continues: "It may be very proper here to take notice of a very great and dangerous mistake Mr Miller has committed, by saying, under this article of stone-pine, that seeds kept in the cones will be good and grow if they are sown ten or twelve years after the cones have been gathered from the trees; whereas the seeds of this sort, whether kept in the cones or taken out, are never good after the first year; and though sometimes a few plants will come up from the seeds that are kept in the cones for two years before, yet this is but seldom; neither must a tenth part of a crop be expected. This caution is the more necessary, as several gentlemen who had cones, upon reading Mr Miller's book, and finding the seeds would take no damage when kept there, deferred the work for a season or two, when they thought they should have more conveniency either of men or ground for their purpose; and were afterwards wholly disappointed, no plants appearing, the seeds being by that time spoiled and worth nothing."

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3. The *rubra*, commonly called the *Scots fir* or *pine*. It is common throughout Scotland, whence its name; though it is also found in most of the other countries of Europe. M. du Hamel, of the Royal Academy of Sciences, mentions his having received some seeds of it from St Domingo in the West Indies; and thence concludes, that it grows indifferently in the temperate, frigid, and torrid zones. The wood of this tree is the red or yellow deal, which is the most durable of any of the kinds yet known. The leaves of this tree are much shorter and broader than those of the former sort, of a greyish colour, growing two out of one sheath; the cones are small, pyramidal, and end in narrow points; they are of a light colour, and the seeds are small.

Pinus.

4. The *pinus picea*, or yew-leaved fir, is a tall evergreen and a native of Scotland, Sweden, and Germany. This species includes the silver fir and the balm of Gilead fir. The first of these is a noble upright tree. Mr Marsham says, "The tallest trees I have seen were spruce and silver firs in the valleys in Switzerland. I saw several firs in the dockyards in Venice 40 yards long; and one of 39 yards was 18 inches diameter at the small end. I was told they came from Switzerland."

The branches are not very numerous, and the bark is smooth and delicate. The leaves grow singly on the branches, and their ends are slightly indented. Their upper surface is of a fine strong green colour, and their under has an ornament of two white lines running lengthwise on each side the midrib; on account of which silvery look this sort is called the *silver fir*. The cones are large, and grow erect; and, when the warm weather comes on, they soon shed their seeds; which should be a caution to all who wish to raise this plant, to gather the cones before that happens.

*Treatise on
Planting and
Ornamental
Gardening.*

The balm of Gilead fir has of all the sorts been most coveted, on account of the great fragrance of its leaves; though this is not its only good property: for it is a very beautiful tree, naturally of an upright growth, and the branches are so ornamented with their balmy leaves, as to exceed any of the other sorts in beauty. The leaves, which are very closely set on the branches, are broad; and their ends are indented. Their upper surface, when healthy, is of a fine dark-green colour, and their under has white lines on each side the midrib lengthwise, nearly like those of the silver fir. These leaves when bruised are very finely scented; and the buds, which swell in the autumn for the next year's shoot, are very ornamental all winter, being turgid, and of a fine brown colour: and from these also exudes a kind of fine turpentine, of the same kind of (though heightened) fragrantcy. The tree being wounded in any part, emits plenty of this turpentine; and Hanbury says, "it is supposed by many to be the sort from whence the balm of Gilead is taken, which occasions this tree being so called. But this is a mistake; for the true balm of Gilead is taken from a kind of terebinthus: though I am informed, that what has been collected from this tree has been sent over to England from America (where it grows naturally), and often sold in the shops for the true sort."

The silver fir is very hardy, and will grow in any soil or situation, but always makes the greatest progress in rich loamy earth. The balm of Gilead fir must be planted in deep, rich, good earth; nor will it live long

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in

Pinus, in any other. The soil may be a black mould, or of a sandy nature, if it be deep enough, and if the roots have room enough to strike freely.

Ibid.

5. The *pinus abies*, or European spruce fir, a native of the northern parts of Europe and of Asia, includes the Norway spruce and long-coned Cornish fir. The former of these is a tree of as much beauty while growing as its timber is valuable when propagated on that account. Its growth is naturally like the silver, upright: and the height it will aspire to may be easily conceived, when we say that the white deal, so much coveted by the joiners, &c. is the wood of this tree; and it may perhaps satisfy the curious reader to know, that from this fir pitch is drawn. The leaves are of a dark-green colour; they stand singly on the branches, but the younger shoots are very closely garnished with them. They are very narrow; their ends are pointed; and they are possessed of such beauties as to excite admiration. The cones are eight or ten inches long, and hang downwards.

The better the soil is, the faster will the spruce fir grow, though it will thrive very well in most of our English lands. In strong loamy earth it makes a surprising progress; and it delights in fresh land of all sorts, which never has been worn out by ploughing, &c. though it be ever so poor. The long-coned Cornish fir differs scarcely in any respect from the Norway spruce, except that the leaves and the cones are larger.

6. The *pinus Canadensis*, American or Newfoundland spruce fir, a native of Canada, Pennsylvania, and other parts of North America, includes three varieties. The white Newfoundland spruce, the red Newfoundland spruce, and the black Newfoundland spruce. These, however, differ so little, that one description is common to them all. They are of a genteel upright growth, though they do not shoot so freely or grow so fast with us as the Norway spruce. The leaves are of the same green, and garnish the branches in the same beautiful manner as those of that species; only they are narrower, shorter, and stand closer. The greatest difference is observable in the cones; for these are no more than about an inch in length, and the scales are closely placed. In the cones, indeed, consists the difference of these three sorts: those of the white species are of a very light brown colour; those of the red species more of a nut-brown or reddish colour; and those of the black species of a dark or blackish colour. Besides this, there is scarcely any material difference; though it is observable, that this trifling variation seems to be pretty constant in the plants raised from the like seeds. These sorts will often flower, and produce cones when only about five or six feet high; and indeed look then very beautiful: but this is a sign of weakness in the plant, which it does not often fairly get over.

7. The *pinus balsamea*, or hemlock fir, a native of Virginia and Canada, possesses as little beauty as any of the fir tribe; though, being rather scarce in proportion, it is deemed valuable. It is called by some the *yew-leaved fir*, from the resemblance of the leaves to those of the yew tree. It is a tree of low growth, with but few branches; and these are long and slender, and spread abroad without order. The leaves do not garnish the branches so plentifully as those of any other sort of fir. The cones are very small and rounded; they are about

half an inch long; and the scales are loosely arranged. We receive these cones from America, by which we raise the plants; though this caution should be given to the planter, that this tree is fond of moist rich ground, and in such a kind of soil will make the greatest progress.

8. The *pinus orientalis*, or oriental fir, a native of the East, is a low but elegant tree. The leaves are very short, and nearly square. The fruit is exceeding small, and hangs downward; and the whole tree makes an agreeable variety with the other kinds.

9. The *strobis*, Lord Weymouth's pine, or North American white pine. This grows sometimes to the height of 100 feet and upwards, and is highly valued on account of its beauty. The bark of the tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of one sheath; the branches are pretty closely garnished with them, and thus make a fine appearance. The cones are long, slender, and very loose, opening with the first warmth of the spring; so that if they are not gathered in winter, the scales open and let out the seeds. The wood of this sort is esteemed for making masts for ships. In Queen Anne's time there was a law made for the preservation of these trees, and for the encouragement of their growth in America. Within these last 50 years they have been propagated in Britain in considerable plenty.

With respect to the culture of this species, Mr Hanbury, after some more general directions, continues thus, "I have known gentlemen, who, in attempting to raise these trees, have seen the young plants go off without perceiving the cause; and the more watering and pains they have taken, have found the plants perish in this way more and more, to their great mortification and astonishment. In the spring following these plants should be pricked out in beds half a foot asunder each way; and here they may stand two years, when they may be either finally planted out, or removed into the nursery, at the distance of one foot asunder, and two feet in the rows. If care has been taken of them in the nursery, they may be removed at a considerable height with great assurance of success: for it is much easier to make this pine grow than any of the other sorts: so that where they are wanted for ornament in parks, open places, &c. a show of them may be made in a little time.

"The soil the Weymouth pine delights in most is a sandy loam; but it likes other soils of an inferior nature: and although it is not generally to be planted on all lands like the Scotch fir, yet I have seen it luxuriant and healthy, making strong shoots, on blue and red clays, and other sorts of strong ground. On stony and and flaty ground, likewise, I have seen some very fine trees; so that I believe whoever is desirous of having plantations of this pine, need not be curious in the choice of his ground."

10. The *pinus taeda*, or swamp-pine, is a tall evergreen tree, a native of the swamps of Virginia and Canada. There are several varieties of this genus which Hanbury enumerates and describes: such as, 1st, The three-leaved American swamp-pine. 2d, The two-leaved American pine. 3d, The yellow American pine, the yellow tough pine, and the tough pine of the plains; among

Pinus. among which there is but little variety. 4th, The bastard pine. 5th, The frankincense pine. And, 6 The dwarf pine.

"There are many (continues our author) other sorts of American pines, which we receive from thence with the like cant names of those of the above, which I have chosen to retain, as they will probably be continued to be sent over; and that the gardener receiving them as such may best know what to do with them. In many of those sorts I see at present no material difference; so am induced to think they are the same, sent over with different names. Some of the sorts above-mentioned differ in very few respects; but I have chosen to mention them, as a person may be supplied with the seeds from Pennsylvania, Jersey, Virginia, Carolina, &c. where they all grow naturally: and having once obtained the seeds, and from them plants, they will become pleasing objects of his nicest observations."

11. The *pinus cedrus*, ranked by Tournefort and others under *larix*, famous for its duration, is that popularly called by us the *cedar of Lebanon*, by the ancients *cedrus magna* or the *great cedar*; also *cedrelate*, *κεδρελάτη*; and sometimes the Phœnician or Syrian cedar, from the country where it grows in its greatest perfection. It is a coniferous evergreen, of the bigger sort, bearing large roundish cones of smooth scales, standing erect, the leaves being small, narrow, and thick set.—They sometimes counterfeit cedar, by dying wood of a reddish hue: but the smell discovers the cheat, that of true cedar being very aromatic. In some places, the wood of the cajou-tree passes under the name of cedar, on account of its reddish colour and its aromatic smell, which somewhat resemble that of santal. Cedar-wood is reputed almost immortal and incorruptible; a prerogative which it owes chiefly to its bitter taste, which the worms cannot endure. For this reason it was that the ancients used cedar tablets to write upon, especially for things of importance, as appears from that expression of Persius, *Et cedra digna locutus*. A juice was also drawn from cedar, with which they smeared their books and writings, or other matters, to preserve them from rotting; which is alluded to by Horace: by means of which it was, that Numa's books, written on papyrus, were preserved entire to the year 535, as we are informed by Pliny.

Solomon's temple, as well as his palace, were both of this wood. That prince gave king Hiram several cities for the cedars he had furnished him on these occasions. Cortes is said to have erected a palace at Mexico, in which were 7000 beams of cedar, most of them 120 feet long, and twelve in circumference, as we are informed by Herrera. Some tell us of a cedar felled in Cyprus 130 feet long, and 18 in diameter. It was used for the main-mast in the galley of king Demetrius. Le Bruyn assures us, that the two biggest he saw on mount Lebanon, measured, one of them 57 palms, and the other 47, in circumference. In the temple of Apollo at Utica, there were cedar trees near 2000 years old; which yet were nothing to that beam in an oratory of Diana at Seguntum in Spain, said to have been brought thither 200 years before the destruction of Troy. Cedar is of so dry a nature, that it will not endure to be fastened with iron nails, from

which it usually shrinks; so that they commonly fasten it with pins of the same wood.

"The statue (says Hanbury) of the great goddess at Ephesus was made of this material; and, if this tree abounded with us in great plenty, it might have a principal share in our most superb edifices. The effluvia constantly emitted from its wood are said to purify the air, and make rooms wholesome. Chapels and places set apart for religious duties, being wainscotted with this wood, inspire the worshippers with a more solemn awe. It is not obnoxious to worms; and emits an oil which will preserve cloth or books from worms or corruption. The saw-dust will preserve human bodies from putrefaction; and is therefore said to be plentifully used in the rites of embalming, where practised."

It is remarkable that this tree is not to be found as a native in any other part of the world than mount Libanus, as far as hath yet been discovered. What we find mentioned in Scripture of the lofty cedars can be nowise applicable to the common growth of this tree; since, from the experience we have of those now growing in England, as also from the testimony of several travellers who have visited those few remaining trees on mount Libanus, they are not inclined to grow very lofty, but on the contrary extend their branches very far; to which the allusion made by the Psalmist agrees very well, when he is describing the flourishing state of a people, and says, "They shall spread their branches like the cedar-tree."

Rauwolf, in his Travels, says, there were not at that time (i. e. anno 1574) upon mount Libanus more than 26 trees remaining, 24 of which stood in a circle; and the other two, which stood at a small distance, had their branches almost consumed with age; nor could he find any younger tree coming up to succeed them, though he looked about diligently for some. These trees (he says) were growing at the foot of a small hill, on the top of the mountains, and amongst the snow. These having very large branches, commonly bend the tree to one side, but are extended to a great length, and in so delicate and pleasant order, as if they were trimmed and made even with great diligence, by which they are easily distinguished, at a great distance, from fir-trees. The leaves (continues he) are very like to those of the larch-tree, growing close together in little branches upon small brown shoots.

Maundrel, in his Travels, says, there were but 16 large trees remaining when he visited the mountain, some of which were of a prodigious bulk, but that there were many more young ones of a smaller size: he measured one of the largest, and found it to be 12 yards six inches in girth, and yet sound, and 37 yards in the spread of its boughs. At about five or six yards from the ground it was divided into five limbs, each of which was equal to a great tree. What Maundrel hath related was confirmed by a gentleman who was there in the year 1720, with this difference only, viz. in the dimensions of the branches of the largest tree, which he measured, and found to be 22 yards diameter. Now, whether Mr Maundrel meant 37 yards in circumference of the spreading branches, or the diameter of them, cannot be determined by his words;

Pinus.

Pinus.

words; yet either of them well agrees with this last account.

12. There is another species, viz. the *larch-tree*, which the old botanists ranked under *larix*, with deciduous leaves, and oval obtuse cones. It grows naturally upon the Alps and Apennines, and of late has been very much propagated in Britain. It is of quick growth, and the trunk rises to 50 feet or more; the branches are slender, their ends generally hanging downward, and are garnished with long narrow leaves which arise in clusters from one point, spreading open above like the hairs of a painter's brush: they are of a light green, and fall away in autumn. In the month of April the male flowers appear, which are disposed in form of small cones; the female flowers are collected into oval obtuse cones, which in some species have bright purple tops, and in others they are white: these differences are accidental; the cones are about an inch long, obtuse at their points; the scales are smooth, and lie over each other: under each scale there are generally lodged two seeds, which have wings. There are other two varieties of this tree, one of which is a native of America, and the other of Siberia. The cones of the American kind which have been brought to Britain seem in general to be larger than those of the common sort.

"Many encomiums (says Hanbury when speaking of this species) have been bestowed on the timber of the larch: and we find such a favourable account of it in ancient authors, as should induce us to think it would be proper for almost any use. Evelyn recites a story of Witsen, a Dutch writer, that a ship built of this timber and cypress had been found in the Numidian sea, twelve fathoms under water, sound and entire, and reduced to such a hardness as to resist the sharpest tool, after it had lain submerged above 1400 years. Certain it is this is an excellent wood for ship and house-building. At Venice this wood is frequently used in building their houses, as well as in Switzerland, where these trees abound: so that, without all doubt, the larch excels for masts for ships, or beams for houses, doors, windows, &c. particularly as it is said to resist the worm.

"In Switzerland (A) their houses are covered with boards of this wood cut out a foot square; and, as it emits a resinous substance, it so diffuses itself into every joint and crevice, and becomes so compact and close, as well as so hardened by the air, as to render the covering proof against all weather. But as such covering for houses would cause great devastation in case of fire, the buildings are confined to a limited distance by an order of police from the magistrates. The wood, when first laid on the houses, is said to be very white; but this colour, in two or three years is changed, by means of the sun and resin, to a black, which appears like a smooth shining varnish."

Pinus.

Of the common larch there are several varieties. The flowers which the commonest sort exhibits early in the spring are of a delicate red colour; another sort produces white flowers at the same season, and these have a delightful effect among those of the red sort; whilst another, called the *Black Newfoundland larix*, increases the variety, though by an aspect little differing from the others. There are also larches with greenish flowers, pale red, &c. all of which are accidental varieties from seeds. These varieties are easily distinguished, even when out of blow: the young shoots of the white-flowering larch are of the lightest green, and the cones when ripe are nearly white. The red flowering larch has its shoots of a reddish cast, and the cones are of a brown colour; whilst the cones and shoots of the black Newfoundland larch are in the same manner proportionally tinged. The cones, which are a very great ornament to several sorts of the pines, are very little to these. Their chief beauty consists in the manner of their growth, the nature and beauty of their pencilled leaves and fair flowers; for the cones that succeed them are small, of a whitish, a reddish, or a blackish brown colour, and make no figure.

The *pinus cedrus* and *pinus larix* are propagated by sowing in March on a bed of light earth exposed to the morning sun. The seed must be covered half an inch thick with fine light earth, and the beds watered at times when the weather is dry. In about six weeks the plants will appear; they must at this time be carefully guarded from the birds, shaded from the sun and winds, and kept very clear of weeds. In the latter end of April the following year, they may be removed into beds of fresh earth, placing them at ten inches distance every way. They are to be kept here two years, and such of them as seem to bend must be tied up to a stake to keep them upright. They may afterwards be planted in the places where they are to remain. They thrive well on the sides of barren hills, and make a very pretty figure there.

Respecting the uses of this tree, Dr Pallas, in his *Flora Rossica*, informs us, that if it is burnt, and the wood consumed, the internal part of the wood distils copiously a drying reddish gum, a little less glutinous than gum arabic, somewhat of a resinous taste, but wholly soluble in water. At the instigation of M. Kinder, this gum has lately been sold in the Russian shops under the name of *gummi Orenburgensis*, but which our author thinks should be called *gummi uraliense* or *laricis*. It is eat by the Woguli as a dainty, and is said to be nutritious and antiscorbutic. Some manna was gathered from the green leaves, but it could never be condensed. The Russians use the *boletus laricinus* as an emetic in intermittents, and to check the leucorrhœa. At Baschir and Siberia the inhabitants sprinkle the dry powder on the wounds of oxen and horses, as a detergent and anthelmintic.

The

(A) "Between Bex and Bevioux (says Coxe in his *Travels in Switzerland*), I observed the larch in great plenty. Painters, from the time of Pliny to that of Raphael, trusted their works to this wood, which the Roman naturalist styles *immortale lignum*. The wood is reckoned excellent for all works which are to lie under water: and the borderers on the lake of Geneva prefer it for building their vessels. In these parts I saw most beautiful woods of chestnut. Haller says that they extend some leagues: he also informs us, that they are found in other parts of Switzerland, and even in desert places in some of the transalpine parts. Accident must have brought them thither, as it appears from Pliny that these trees were first introduced into Europe from Sardinia."

Pinus. The nuts of the *pinus cembra*, the same author asserts, are eat as luxuries in Russia, and are even exported with the same view. The unripe cones give a very fragrant oil, termed balsamic. The inhabitants of Siberia use the tender tops, and even the bark rubbed off in the spring, as an antiscorbutic. The kernels of the nuts of the *amygdalus nana* give a very pleasing flavour to brandy; and, when pressed, afford a bitter oil in large quantities. The way of destroying the bitter is by digesting it in the sun with spirit of wine, and it then becomes sweet and extremely agreeable.

From the larch-tree is extracted what we erroneously call *Venice turpentine*. This substance, or natural balsam, flows at first without incision; when it has done dropping, the poor people who wait in the fir-woods make incisions at about two or three feet from the ground into the trunks of the trees, into which they fix narrow troughs about 20 inches long. The end of these troughs is hollowed like a ladle; and in the middle is a small hole bored for the turpentine to run into the receiver which is placed below it. As the gummy substance runs from the trees, it passes along the sloping gutter or trough to the ladle, and from thence runs through the holes into the receiver. The people who gather it visit the trees morning and evening from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree, Venice turpentine is clear like water, and of a yellowish white; but, as it grows older, it thickens and becomes of a citron colour. It is procured in the greatest abundance in the neighbourhood of Lyons, and in the valley of St Martin near St Lucern in Switzerland.

Though we have already noticed the manner of cultivating some of the particular species of this genus, and have also remarked the uses of some of them, we shall finish the article with a few general observations on the culture and uses of the whole.

Culture. All the sorts of pines are propagated by seeds produced in hard woody cones. The way to get the seeds out of these cones is to lay them before a gentle fire, which will cause the cells to open, and then the seeds may be easily taken out. If the cones are kept entire, the seeds will remain good for some years; so that the surest way of preserving them is to let them remain in the cones till the time for sowing the seeds. If the cones are kept in a warm place in summer, they will open and emit the seeds; but if they are not exposed to the heat, they will remain close for a long time. The best season for sowing the pines is about the end of March. When the seeds are sown, the place should be covered with nets to keep off the birds; otherwise, when the plants begin to appear with the husk of the seed on the top of them, the birds will peck off the tops, and thus destroy them.

Uses. From the first species is extracted the common turpentine, much used by farriers, and from which is drawn the oil of that name. The process of making pitch, tar, resin, and turpentine, from these trees is very familiar. In the spring time, when the sap is most free in running, they pare off the bark of the pine tree, to make the sap run down into a hole which they cut at the bottom to receive it. In the way, as it runs down, it leaves a white matter like cream, but

a little thicker. This is very different from all the kinds of resin and turpentine in use, and it is generally sold to be used in the making of flambeaux instead of white bees wax. The matter that is received in the hole at the bottom is taken up with ladles, and put in a large basket. A great part of this immediately runs through, and this is the common turpentine. This is received into stone or earthen pots, and is ready for sale. The thicker matter, which remains in the basket, they put into a common alembic, adding a large quantity of water. They distil this as long as any oil is seen swimming upon the water. This oil they separate from the surface in large quantities, and this is the common oil or spirit of turpentine. The remaining matter at the bottom of the still is common yellow resin. When they have thus obtained all that they can from the sap of the tree, they cut it down, and, hewing the wood into billets, they fill a pit dug in the earth with these billets, and, setting them on fire, there runs from them, while they are burning, a black thick matter. This naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out at which the tar runs like oil. If this hole be made too large, it sets the whole quantity of the tar on fire; but, if small enough, it runs quietly out.

The tar, being thus made, is put up in barrels; and if it be to be made into pitch, they put it into large boiling vessels, without adding any thing to it. It is then suffered to boil a while, and being then let out, is found when cold to be what we call pitch.

A decoction of the nuts or seeds of the first species in milk, or of the extremities of the branches pulled in spring, is said, with a proper regimen, to cure the most inveterate scurvy. The wood of this species is not valued; but that of the Scots pine is superior to any of the rest. It is observable of the Scots pine, that when planted in bogs, or in a moist soil, though the plants make great progress, yet the wood is white, soft, and little esteemed; but when planted in a dry soil, though the growth of the trees is there very slow, yet the wood is proportionably better. Few trees have been applied to more uses than this. The tallest and straightest are formed by nature for masts to our navy. The timber is resinous, durable, and applicable to numberless domestic purposes, such as flooring and wainscoting of rooms, making of beds, chests, tables, boxes, &c. From the trunk and branches of this, as well as most others of the pine tribe, tar and pitch is obtained. By incision, barras, Burgundy pitch, and turpentine, are acquired and prepared. The resinous roots are dug out of the ground in many parts of the Highlands, and, being divided into small splinters, are used by the inhabitants to burn instead of candles.—At Loch-Broom, in Ross-shire, the fishermen make ropes of the inner bark; but hard necessity has taught the inhabitants of Sweden, Lapland, and Kamtschatka, to convert the same into bread. To effect this, they, in the spring season, make choice of the tallest and fairest trees; then stripping off carefully the outer bark, they collect the soft, white, succulent interior bark, and dry it in the shade. When they have occasion to use it, they first toast it at the fire, then grind, and af-

Pinus.

Pioneers
||
Pipe.

ter steeping the flour in warm water to take off the resinous taste, they make it into thin cakes, which are baked for use. On this strange food the poor inhabitants are sometimes constrained to live for a whole year; and, we are told, through custom, become at last even fond of it. Linnæus remarks, that this same bark-bread will fatten swine; and humanity obliges us to wish, that men might never be reduced to the necessity of robbing them of such a food. The interior bark, of which the above mentioned bread is made, the Swedish boys frequently peel off the trees in the spring, and eat raw with greedy appetite. From the cones of this tree is prepared a diuretic oil, like the oil of turpentine, and a resinous extract, which has similar virtues with the balsam of Peru. An infusion or tea of the buds is highly commended as an antiscorbutic. The farina, or yellow powder, of the male-flowers, is sometimes in the spring carried away by the winds, in such quantities, where the trees abound, as to alarm the ignorant with the notion of its raining brimstone. The tree lives to a great age; Linnæus affirms to 400 years.

PIONEERS, in the art of war, are such as are commanded in from the country, to march with an army for mending the ways, for working on intrenchments and fortifications, and for making mines and approaches. The soldiers are likewise employed for all these purposes. Most of the foreign regiments of artillery have half a company of pioneers, well instructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, saws, spades, and pick-axes. Each pioneer must have an ax, a saw, and an apron; a cap with a leather crown, and a black bears-skin front, on which is to be the king's crest in white, on a red ground; and the number of the regiment is to be on the back part of it.

PIP, or PEP, a disease among poultry, consisting of a white thin skin, or film, that grows under the tip of the tongue, and hinders their feeding. It usually arises from want of water, or from the drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with salt. Hawks are particularly liable to this disease, especially from feeding on stinking flesh.

PIPE, in building, &c. a canal, or conduit, for the conveyance of water and other liquids. Pipes for water, water-engines, &c. are usually of lead, iron, earth, or wood: the latter are usually made of oak or elder. Those of iron are cast in forges; their usual length is about two feet and a half: several of these are commonly fastened together by means of four screws at each end, with leather or old hat between them, to stop the water. Those of earth are made by the potters; these are fitted into one another, one end being always made wider than the other. To join them the closer, and prevent their breaking, they are covered with tow and pitch: their length is usually about that of the iron pipes. The wooden pipes are trees bored with large iron augres, of different sizes, beginning with a less, and then proceeding with a larger successively; the first being pointed, the rest being formed like spoons, increasing in diameter, from one to six inches or more: they are fitted into the ex-

tremities of each other (as represented fig. 2.), and are sold by the foot.

Wooden pipes are bored as follows. The machine represented fig. 1. is put in motion by the wheel A, which is moved by a current of water; upon the axle of this wheel is a cog-wheel B, which causes the lanterns C, D, to turn horizontally, whose common axis is consequently in a perpendicular direction. The lantern D turns at the same time two cog-wheels, E and F: the first, E, which is vertical, turns the augre which bores the wood; and the second, F, which is horizontal, causes the carriage bearing the piece to advance by means of the arms H, I, which takes hold of the notches in the wheel K. The first, H, by means of the notches, draws the wheel towards F; and the other, I, pushes the under-post of the wheel in an opposite direction; both which motions tend to draw the carriage towards F, and consequently cause the augre to pierce the wood. The augre being from 9 to 12 feet in length, and of a proportionable bigness, it will be necessary to have two pieces, as L, L, to support its weight, and cause it to enter the piece to be bored with the same uniformity.

For the construction of leaden pipes, see the article PLUMBERY.

Air-PIPES. See *AIR-PIPES*.

PIPES of an Organ. See *ORGAN*.

Bag-PIPE. See *BAG-PIPE*.

Horn-PIPE. See *HORNPIPE*.

Tobacco-PIPE, a machine used in the smoking of tobacco, consisting of a long tube, made of earth or clay, having at one end a little case, or furnace, called the *bowl*, for the reception of the tobacco, the fumes whereof are drawn by the mouth through the other end. Tobacco-pipes are made of various fashions; long, short, plain, worked, white, varnished, unvarnished, and of various colours, &c. The Turks use pipes three or four feet long, made of rushes, or of wood bored, at the end whereof they fix a kind of a pot of baked earth, which serves as a bowl, and which they take off after smoking.

PIPE, also denotes a vessel or measure for wine, and things measured by wine-measure. See *BARREL* and *MEASURE*.

PIPE, in mining, is where the ore runs forwards endwise in a hole, and doth not sink downwards or in a vein.

PIPE, *Pipa*, in law, is a roll in the exchequer, called also the *great roll*. See the next article.

PIPE-Office, is an office wherein a person called the *clerk of the pipe*, makes out leases of crown-lands, by warrant from the lord-treasurer, or commissioners of the treasury, or chancellor of the exchequer. The clerk of the pipe makes out also all accounts of sheriffs, &c. and gives the accountants their *quietus est*. To this office are brought all accounts which pass the remembrancer's office, and remain there, that if any stated debt be due from any person, the same may be drawn down into the great roll of the pipe: upon which the comptroller issues out a writ, called the *summons of the pipe*, for recovery thereof; and if there be no goods or chattels, the clerk then draws down the debts to the lord treasurer's remembrancer, to write estreats against their lands. All tallies which vouch the

Pipe.

Plate
CCCXCIII.

Pipe,
Piper.

the payment of any sum contained in such accounts are examined and allowed by the chief secondary of the pipe. Besides the chief clerk in this office, there are eight attorneys or sworn clerks, and a comptroller.

PIPE Fish, in ichthyology. See SYNGNATHUS.

Sea-PIPES, in zoology, are univalve shells, of an oblong figure, terminating in a point, sometimes a little bending, and sometimes straight. Sea ears, figures of which we have given along with the sea-pipes, are also univalve flat shells, resembling in shape the ear of a man. In sea ears it is not uncommon to find small pearls, the seeds of which are often found in the middle of their cavities, which are of the finest naker or mother-of-pearl colour. There are ridges on both sides; those without form a kind of volute or spire, terminating in an eye. In these shells there is a row of round holes, six of which generally go quite through.

There is a shell of this kind, which is longer in proportion to its width, and much less common, for it is never found in our seas. There is yet another, very fine and thin, of a dirty grey colour, neither nakered nor perforated as the others are; the inner rim is spiral, and at some distance from the outer.

The sea-pipes are distinguished from sea-worms by having their pipes single; whereas the others form an assemblage of pipes joined together. The sea worms, from the number and junction of their parts, are multivalves. The shells of pipes called *dentales* and *antales* are distinguished from each other only by their size, the antales being much the least. The *sea pencil*, or *watering spout*, is the most remarkable shell of this tribe, and must be considered as having a specific character either by its form, which is straight, or the singularity of its superior extremity, which is perforated like the spout of a watering pot.

In Plate CCCXCII. the shell, fig. 1. pierced with many holes, is found with its natural covering in our seas. It is finely nakered within, and in the middle of its hollow or cavity contains many small pearls. Fig. 2. is placed on its upper side to show its spots, which are red upon a ground of the purest white; the ridges are prominent; the rim and the eye are irregular and notched. Fig. 4. the singularity of this shell consists in its being neither nakered nor perforated, and in turning very much up near the eye of its spire or contour. Fig. 5. is a pencil or watering spout; at the head is a kind of ruff, and within it is formed like the end of a watering spout, perforated with many holes, which, when the fish is alive, are filled with very fine threads, like the hairs of a painter's pencil. Fig. 6. are called dentals from their resemblance of elephants teeth; the point or apex is white, and the other extremity green. They are both ribbed and nakered, and are distinguished from each other only by some excrescences which appear on the uppermost. Fig. 7. are two small shells of the dental figure, called for distinction antales. They are perfectly smooth; one is white, and the other reddish.

PIPER, in ichthyology. See TRIGLA.

Piper.

PIPER, *Pepper*; a genus of the trigynia order, belonging to the diandria class of plants. There are 20 species, of which the most remarkable is the *firiboa*, with oval, heart-shaped, nerved leaves, and reflexed spikes. This is the plant which produces the pepper so much used in food. It is a shrub whose root is small, fibrous, and flexible; it rises into a stem, which requires a tree or a prop to support it. Its wood has the same sort of knots as the vine; and when it is dry, it exactly resembles the vine-branch. The leaves, which have a strong smell and a pungent taste, are of an oval shape; but they diminish towards the extremity, and terminate in a point. From the flower-buds, which are white, and are sometimes placed in the middle and sometimes at the extremity of the branches, are produced small berries resembling those of the currant-tree. Each of these contains between 20 and 30 corns of pepper; they are commonly gathered in October, and exposed to the sun seven or eight days. The fruit, which was green at first, and afterwards red, when stripped of its covering assumes the appearance it has when we see it. The largest, heaviest, and least shrivelled, is the best.

The pepper plant flourishes in the islands of Java, Sumatra (A), and Ceylon, and more particularly on the Malabar coast. It is not sown, but planted; and great nicety is required in the choice of the shoots. It produces no fruit till the end of three years; but bears so plentifully the three succeeding years, that some plants yield between six and seven pounds of pepper. The bark then begins to shrink; and the shrub declines so fast, that in 12 years time it ceases bearing.

The culture of pepper is not difficult: it is sufficient to plant it in a rich soil, and carefully to pull up the weeds that grow in great abundance round its roots, especially the three first years. As the sun is highly necessary to the growth of the pepper plant, when it is ready to bear, the trees that support it must be lopped to prevent their shade from injuring the fruit. When the season is over, it is proper to crop the head of the plant. Without this precaution, there would be too much wood, and little fruit.

The pepper exported from Malabar, which was formerly entirely in the hands of the Portuguese, and is at present divided between the Dutch, British, and French, amounts to about 10,000,000 weight. Betel, or betle, is a species of this genus. See BETEL. It is a creeping and climbing plant like the ivy; and its leaves a good deal resemble those of the citron, though they are longer and narrower at the extremity. It grows in all parts of India, but thrives best in moist places. The natives cultivate it as we do the vine, placing props for it to run and climb upon; and it is a common practice to plant it against the tree which bears the areca nut.

At all times of the day, and even in the night, the Indians chew the leaves of the betel, the bitterness of which is corrected by the areca that is wrapped up in them. There is constantly mixed with it the chinam, a kind of burnt lime made of shells. The rich frequently

(A) See a copious account of the mode of cultivating pepper in Sumatra, in Mr Marsden's *History of Sumatra*, or in the *New Annual Register* for 1783, p. 147.

Piper,
Pipra.

fy add perfumes, either to gratify their vanity or their sensuality.

It would be thought a breach of politeness among the Indians to take leave for any long time, without presenting each other with a purse of betel. It is a pledge of friendship that relieves the pain of absence. No one dares to speak to a superior unless his mouth is perfumed with betel; it would even be rude to neglect this precaution with an equal. The women of gallantry are the most lavish in the use of betel, as being a powerful incentive to love. Betel is taken after meals; it is chewed during a visit; it is offered when you meet, and when you separate; in short, nothing is to be done without betel. If it is prejudicial to the teeth, it assists and strengthens the stomach. At least, it is a general fashion that prevails throughout India.

London Medical Journal, vol. viii part iii, p. 276, &c.

The *piper amalago*, or black pepper, and the *piper inequale*, or long pepper of Jamaica, with some other species, are indigenous, and known by the names of *joint wood*, or *peppery elders*. The first bears a small spike, on which are attached a number of small seeds of the size of mustard. The whole of the plant has the exact taste of the East India black pepper. The long pepper bush grows taller than the amalago. The leaves are broad, smooth, and shining. The fruit is similar to the long pepper of the shops, but smaller. The common people in Jamaica season their messes with the black pepper. To preserve both, the fruit may be slightly scalded when green, then dried, and wrapped in paper. Perhaps hereafter they may be deemed worthy of attention.

PIPRA, in ornithology; a genus of birds of the order of *passeres*. Latham gives it the name of *manakin*, and so does Buffon, who informs us that it was bestowed upon them by the Dutch settlers in Surinam. Latham describes 25 different species, and five varieties. The general character of the genus is, that the bill is short, strong, hard, and slightly incurved, and the nostrils are naked. The middle toe is connected to the outer as far as the third joint: this character, however, is not altogether universal, some of the species differing in this particular. The tail is short. This genus has a considerable resemblance to the genus *parus*, or titmouse. They are supposed to inhabit South America only; but this is not true, for Mr Latham assures us that he has seen many of those species which he has described which came from other parts, but which nevertheless certainly belong to this genus.—Buffon differs widely in his arrangement from Mr Latham, and only enumerates six distinct species. Without particularizing those differences, however, we shall give from Buffon the following elegant account of the genus in general: “The natural habits common to them all were not known, and the observations which have been made are still insufficient to admit an exact detail. We shall only relate the remarks communicated to us by Sonini of Manoncour, who saw many of these birds in their native climates. They inhabit the immense forests in the warm parts of America, and never emerge from their recesses to visit the cleared grounds or the vicinity of the plantations. They fly with considerable swiftness, but always at a small height, and to short distances; they never perch on the summits of trees, but on the middle branches; they feed upon

small wild fruits, and also eat insects. They generally occur in small bodies of eight or ten of the same species, and sometimes intermingled with other flocks of the same genus, or even of a different genus, such as the Cayenne warblers, &c. It is commonly in the morning that they are found thus assembled, and then seem to be joyous, and warble their delicate little notes. The freshness of the air seems to inspire the song, for they are silent during the burning heat of the day, and disperse and retire to the shade of the thickest parts of the forest. This habit is observed, indeed, in many kinds of birds, and even in those of the woods of France, where they collect to sing in the morning and evening; but the manakins never assemble in the evening, and continue together only from sun-rise to nine or ten o'clock in the forenoon, and remain separate during the rest of the day and the succeeding night. In general they prefer a cool humid situation, though they never frequent marshes or the margins of lakes.”

1. The *pipra rupicola*, or crested manakin, is about the size of a small pigeon, being about 10 or 12 inches long. The bill is about an inch and a quarter long, and of a yellowish colour. The head is furnished with a double round crest; the general colour of the plumage is orange, inclining to saffron; the wing coverts are loose and fringed; the quills are partly white and partly brown; the tail feathers are in number 12; the base half of the ten middle ones is of an orange colour, from thence to the ends they are brown; the outer feathers are brown, and the base half of the inner web is orange; all of them are similarly fringed; the upper tail coverts are very long, loosely webbed, and square at the ends; the legs and claws are yellow. The female is altogether brown, except the under wing coverts, which are of a rufous orange; the crest is neither so complete nor rounded as that of the male. Both males and females are at first grey, or of a very pale yellow, inclining to brown. The male does not acquire the orange colour till the second year, neither does the female the full brown.

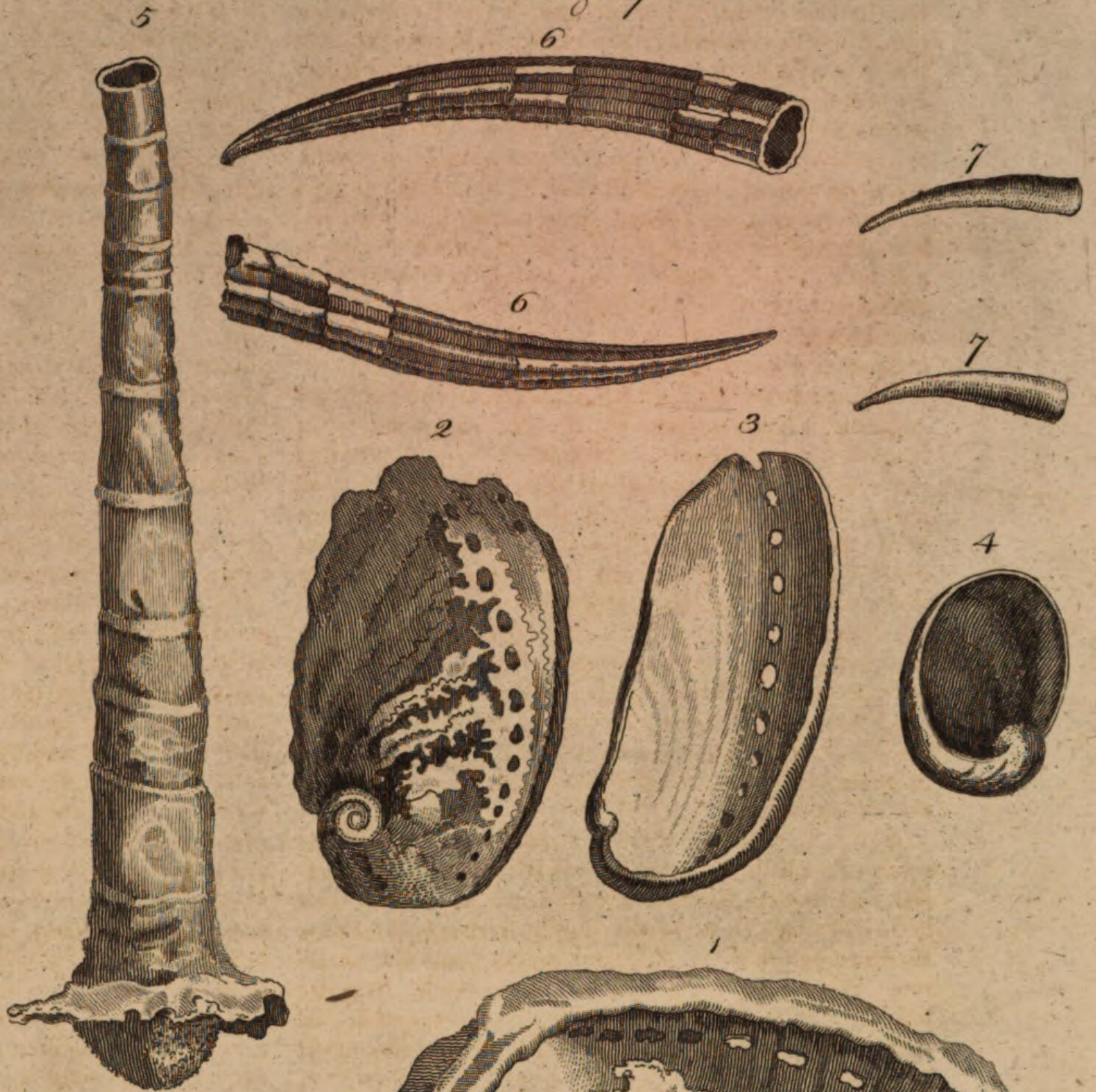
“This beautiful species (says Latham), inhabits various parts of Surinam, Cayenne, and Guiana, in rocky situations; but is nowhere so frequent as in the mountain Luca, near the river Oyapoc, and in the mountain Courouaye, near the river Aprouack, where they build in the cavernous hollows, and the darkest recesses. They lay two round white eggs, the size of those of a pigeon, and make the nest of a few dry bits of sticks. They are in general very shy, but have been frequently tamed, inasmuch as to run at large among the poultry. It is said that the female, after she has laid eggs for some years, and ceases so to do more, becomes at the ensuing moult of the same colour as the male, and may be mistaken for him; in this imitating the females of various kinds of poultry, such as the peacock, pheasant, &c. (See PAVO, &c.) A most complete pair is in the Leverian Museum.” Our author describes a variety of this species, which he calls the *Peruvian manakin*. It is longer than the preceding, especially in the tail, and the upper coverts of it are not truncated at the ends; the wing coverts are not fringed, as in the rock manakin, and the crest is not so well defined as in that bird; the general colour of the plumage inclines much to red; the second

Pipra.

Phaenicopterus Ruber
The Flamingo.



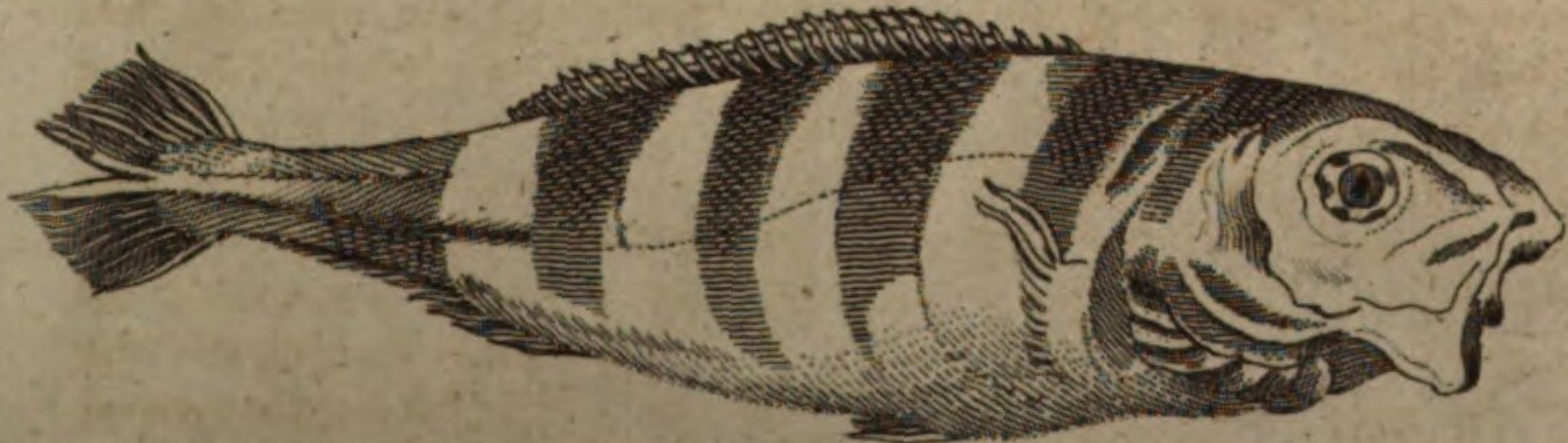
Sea ears & Pipes.



Pinna.



Pilot fish.



Pholas.



*Machine for boring wooden
PIPES.*

Plate CCCXCIII.

Fig. 2.

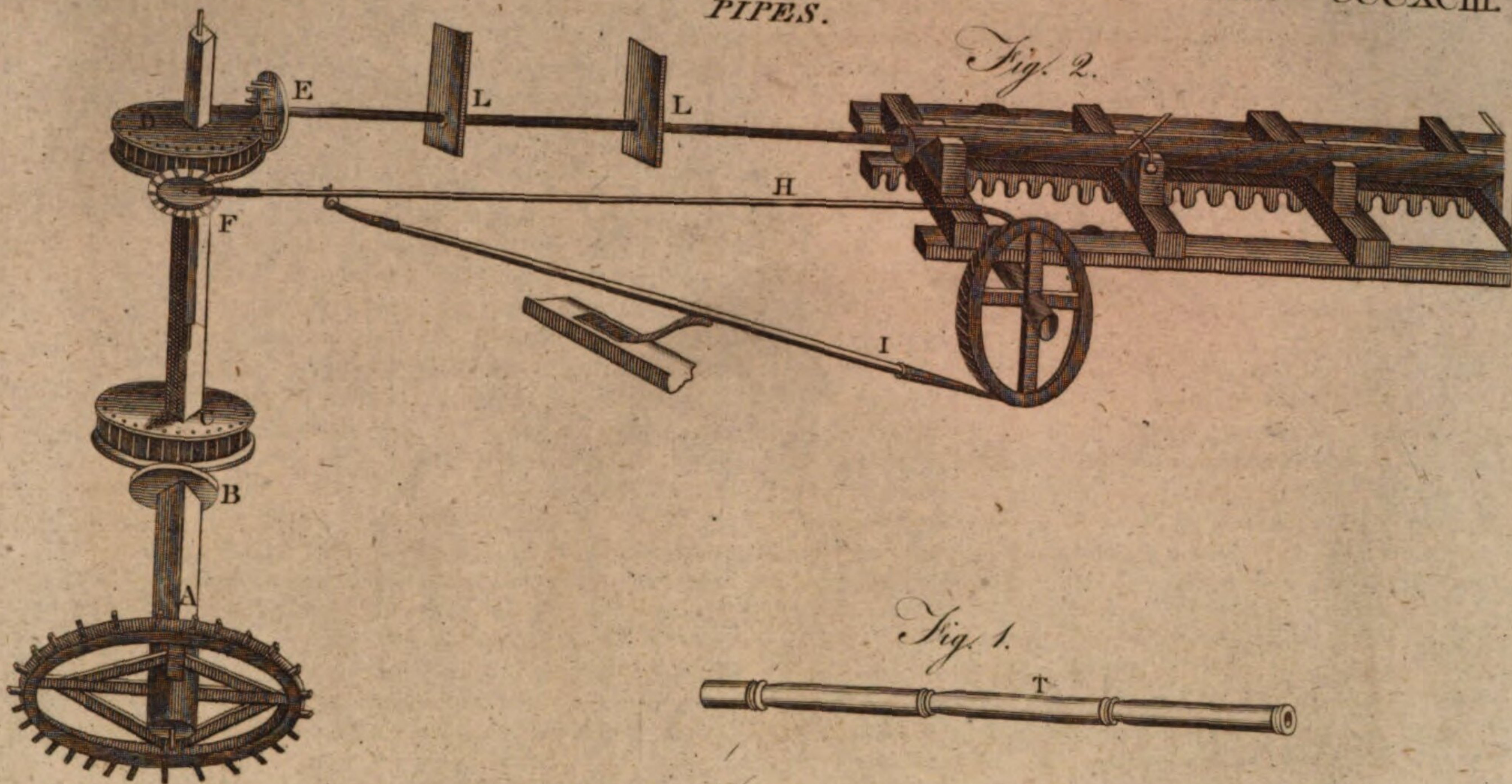
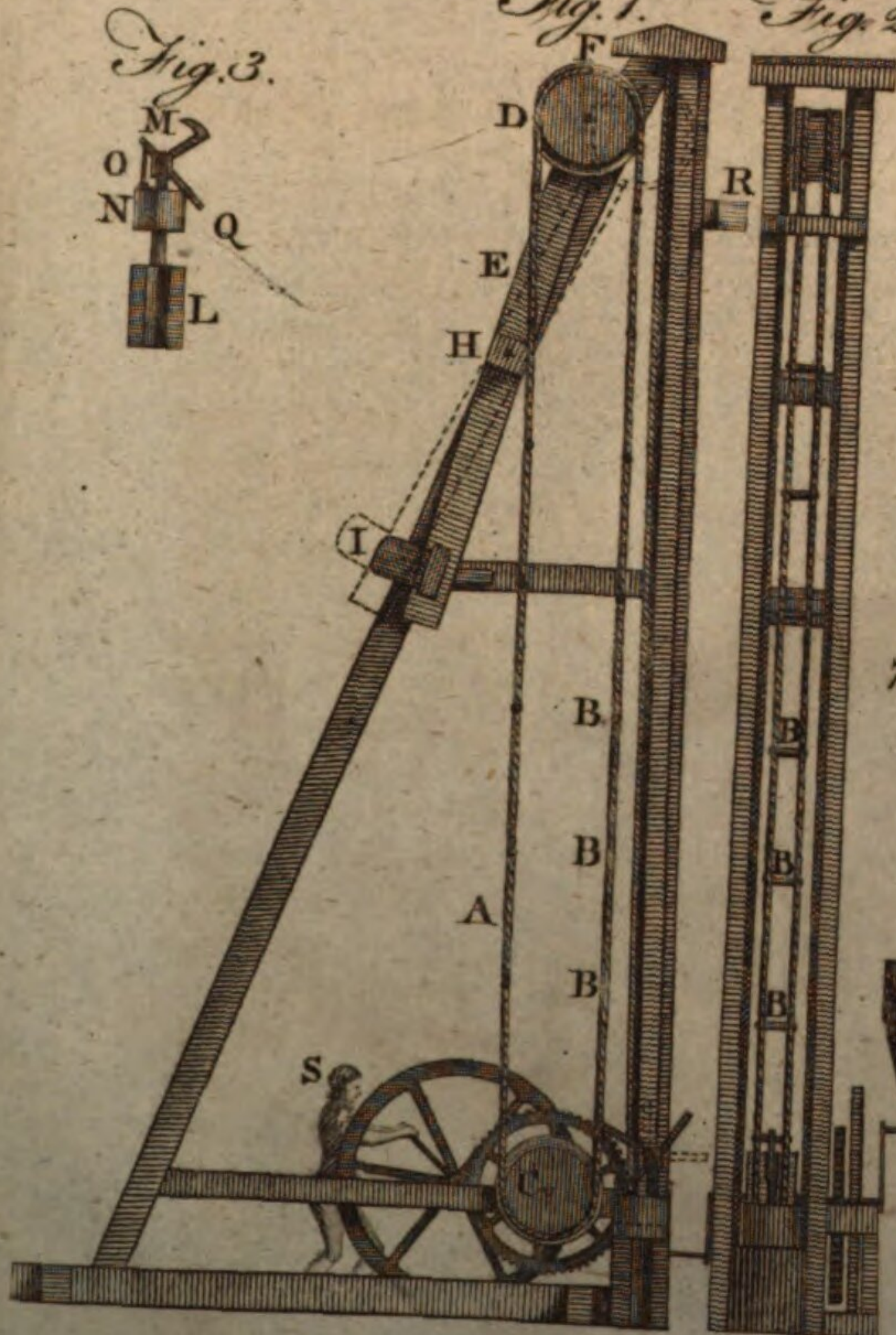


Fig. 1.

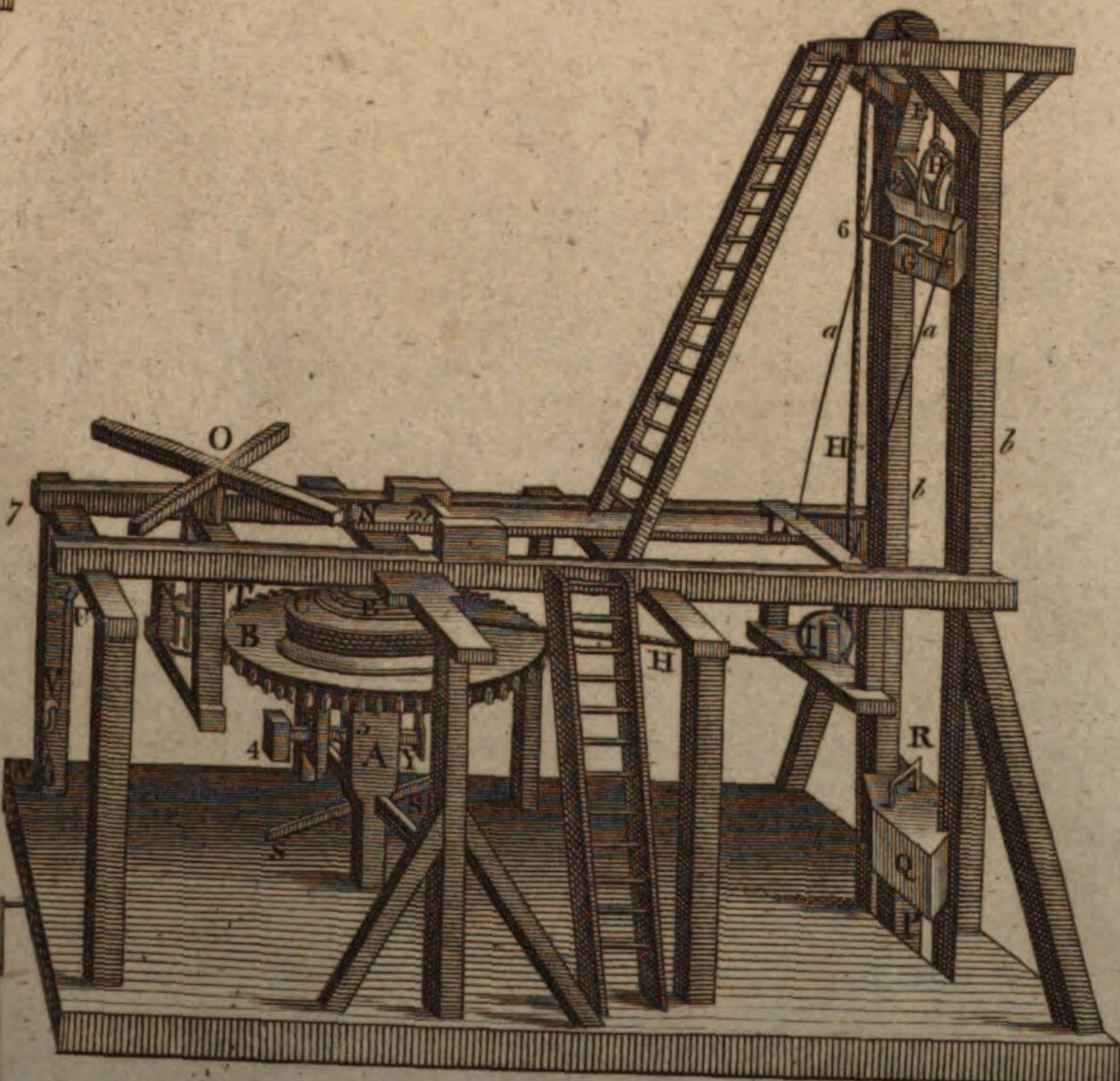


Bunce's PILE Engine.
Fig. 1. *Fig. 2.*

Fig. 3.



Vaulon's PILE Engine.



A Bell Print. W. & S. Sculptor fecit.

Pipra,
Piquet.

cond coverts and rump are of an ash colour; the wings and tail are black; the bill and legs are as in the last described. It is an inhabitant of Peru, from whence its name.

2. The next and last species which we shall describe (for it would be impossible to enumerate them all), Mr Latham calls the *tuneful manakin*. Its length is four inches; the bill is dusky, the forehead yellow, and the crown and nape blue; the chin, sides of the head below the eyes, and the throat, are black; the upper part of the back, the wings, and the tail, are dusky black; the tail is very short; the lower part of the back and rump, the breast, belly, vent, and thighs, are orange coloured; the legs are dusky. It is a native of St Domingo, where it has gained the name of *organiste* from its note, forming the complete octave in the most agreeable manner, one note successively after another. It is said not to be uncommon, but not easy to be shot, as, like the creeper, it perpetually shifts to the opposite part of the branch from the spectator's eye, so as to elude his vigilance. It is most likely the very bird mentioned by Du Pratz, above quoted, whose notes, he says, are so varied and sweet, and which warbles so tenderly, that those who have heard it value much less the song of the nightingale. It is said to sing for near two hours without scarce taking breath, and after a respite of about the same time begins again. Du Pratz, who himself has heard it, says that it sung perched on an oak, near the house he was then in.

PIQUET, or PICKET, a celebrated game at cards, much in use throughout the polite world.

It is played between two persons, with only 32 cards; all the dukes, threes, fours, fives, and sixes, being set aside.

In reckoning at this game, every card goes for the number it bears, as a ten for ten; only all court cards go for ten, and the ace for eleven: and the usual game is one hundred up. In playing, the ace wins the king, the king the queen, and so down.

Twelve cards are dealt round, usually by two and two; which done, the remainder are laid in the middle: if one of the gamesters finds he has not a court-card in his hand, he is to declare he has *carte-blanche*, and tell how many cards he will lay out, and desire the other to discard, that he may show his game, and satisfy his antagonist that the *carte-blanche* is real; for which he reckons ten.

Each person discards, *i. e.* lays aside a certain number of his cards, and takes in a like number from the stock. The first of the eight cards may take three, four, or five; the dealer all the remainder, if he pleases.

After discarding, the eldest hand examines what suit he has most cards of; and reckoning how many points he has in that suit, if the other have not so many in that or any other suit, he tells one for every ten of that suit. He who thus reckons most is said to win the point.

The point being over, each examines what *sequences* he has of the same suit, *viz.* how many tierces, or sequences of three, quarte or fours, quintes or fives, sixiemes, or six's, &c. For a tierce they reckon three points, for a quarte four, for a quinte 15, for a sixieme 16, &c. And the several sequences are distinguished in dignity by the cards they begin from: thus ace

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king, and queen, are called *tierce major*; king, queen, and knave, *tierce to a king*; knave, ten, and nine, *tierce to a knave*, &c. and the best tierce, quarte, or quinte, *i. e.* that which takes its descent from the best card, prevails, so as to make all the others in that hand good, and destroy all those in the other hand. In like manner, a quarte in one hand sets aside a tierce in the other.

The sequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three of any sort, three: but here too, as in sequences, he that with the same number of threes has one that is higher than any the other has, *e. gr.* three aces, has all his others made good hereby, and his adversary's all set aside. But four of any sort, which is called a *quatorze*, always sets aside three.

All the game in hand being thus reckoned, the eldest proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the suit; and the highest card of the suit wins the trick. Note, unless a trick be won with a card above a nine (except the last trick), nothing is reckoned for it; though the trick serves afterwards towards winning the cards; and that he who plays last does not reckon for his cards unless he wins the trick.

The cards being played out, he that has most tricks reckons ten for winning the cards. If they have tricks alike, neither reckons any thing. The deal being finished, and each having marked up his game, they proceed to deal again as before, cutting afresh each time for the deal.

If both parties be within a few points of being up, the *carte blanche* is the first thing that reckons, then the point, then the sequences, then the quatorzes or threes, then the tenth cards.

He that can reckon 30 in hand by *carte-blanche*, points, quintes, &c. without playing, ere the other has reckoned any thing, reckons 90 for them; and this is called a *repique*. If he reckons above 30, he reckons so many above 90. If he can make up 30, part in hand and part play, ere the other has told any thing, he reckons for them 60. And this is called a *pique*. Whence the name of the game. He that wins all the tricks, instead of ten, which is his right for winning the cards, reckons 40. And this is called a *capot*.

Mr de Moivre, who has made this game the object of mathematical investigations, has proposed and solved the following problems: 1. To find at piquet the probability which the dealer has for taking one ace or more in three cards, he having none in his hand. He concludes from his computation, that it is 29 to 28 that the dealer takes one ace or more. 2. To find at piquet the probability which the eldest has of taking an ace or more in five cards, he having no ace in his hand. Answer; 232 to 91, or 5 to 2, nearly. 3. To find at piquet the probability which the eldest hand has of taking an ace and a king in five cards, he having none in his hand. Answer; the odds against the eldest hand taking an ace and a king are 331 to 315, or 21 to 20 nearly. 4. To find at piquet the probability of having 12 cards dealt to, without king, queen, or knave, which case is commonly called *cartes-blanches*. Answer; the odds against *cartes-blanches* are 1791 to 1 nearly.

5 E

Piquet.

Pira.

nearly. 5. To find how many different sets, essentially different from one another, one may have at piquet before taking in. Answer; 28,967,278. This number falls short of the sum of all the distinct combinations, whereby 12 cards may be taken out of 32, this number being 225,792,840; but it must be considered that in that number several sets of the same import, but differing in suit, might be taken, which would not introduce an essential difference among the sets. The same author gives also some observations on this game, which he had from an experienced player. See *Doctrine of Chances*, p. 179, &c. M. de Monmort has treated of piquet in his *Analyse des Jeux de Hazard*, p. 162.

PIRA, is a name by which a variety of foreign fishes are distinguished. The *pira aca* is a little horned fish of the West Indies, called by Celsus and others the *monoceros* or *unicorn fish*. The *pira acangata* is the name of a Brazilian fish, which resembles the perch both in size and shape. It seldom exceeds four or five inches in length; its mouth is small; its tail forked. On the back it has only one long fin, which is supported by rigid and prickly spines. This fin it can depress at pleasure, and sink within a cavity made for it in the back. Its scales are of a silvery white colour; it is wholesome and well tasted. *Pira bebe* is the name of the milvus, or kite-fish. *Pira-caba* is an American fish of the truttaceous kind, of a very delicate flavour. It grows to the length of 12 inches; its nose is pointed, and its mouth large, but without teeth; the upper jaw is longer than the under one, and hangs over like a cartilaginous prominence; its eyes are very large, and its tail is forked; under each of the gill fins there is a beard made of six white filaments, and covered with silvery scales. *Pira jurumenbeca* is a Brazilian fish, otherwise called *bocca molle*. It lives in the muddy bottom of the American seas, and is a long bodied not flatted fish. It grows to a great size, being found nine, and sometimes even ten or eleven, feet long, and two feet and a half thick. It has one long fin on the back, the anterior part of which is thin and pellucid. There is also a cavity on the back, as in the *pira acangata*, into which the fin can be depressed at pleasure; the tail is not forked, and the scales are all of a silvery colour and brightness. The fish is very well tasted; the *pira pixanga* is another Brazilian fish of the turdus or wrasse kind, and called by some the *garfish*. It is generally about four or five inches long; its mouth is pretty large, and furnished with very small and very sharp teeth; its head is small, but its eyes are large and prominent, the pupil being of a fine turquoise colour, and the iris yellow and red in a variety of shades. The coverings of the gills end in a triangular figure, and are terminated by a short spine or prickle; its scales are very small, and so evenly arranged, and closely laid on the flesh, that it is very smooth to the touch; its tail is rounded at the end; its whole body, head, tail, and fins, are of a pale yellow colour, variegated all over with very beautiful blood-coloured spots; these are round, and of the bigness of hemp-seed on the back and sides, and something larger on the belly; the fins are all spotted in the same manner, and are all marked with an edge of red. It is caught among the rocks, and about the shores, and is a very well tasted fish. *Piranha* is an American fish, more generally

known by the name *piraya*. *Piraguiba*, or *Ipiraguiba*, is the name of a fish originally Brazilian, which some writers apply to the *remora* or *sucking fish*.

PIRÆUS PORTUS, (anc. geog.), a celebrated port to the west of Athens, consisting naturally of three harbours or basons, (Thucydides); which lay neglected, till Themistocles put the Athenians on making it a commodious port, (Nepos); the Phalerus, a small port, and not far from the city, being what they used before that time, (Pausanias, Nepos). Piræus was originally a village of Attica, (Pausanias); an island, (Strabo); and though distant 40 stadia from Athens, was joined to it by two long walls, (Thucydides), and itself locked or walled round, (Nepos): A very commodious and safe harbour. The whole of its compass was 60 stadia, including the Munichia. Not far from the Piræus stood the sepulchre of Themistocles; whither his friends conveyed his bones from Magnesia, into the Hither Asia, (Cicero, Plutarch, Pausanias). The entrance of the Piræus is narrow, and formed by two rocky points, one belonging to the promontory of Ection, the other to that of Alcmus. Within were three stations for shipping; Kantharus, so named from a hero; Aphrodisium, from a temple of Venus; and Zea, the resort of vessels laden with grain. By it was a demos or borough town of the same name before the time of Themistocles, who recommended the exchanging its triple harbour for the single one of Phalerum, both as more capacious and as better situated for navigators. The wall was begun by him when archon, in the second year of the 75th Olympiad, 477 years before Christ; and afterwards he urged the Athenians to complete it as the importance of the place deserved. This whole fortification was of hewn stone, without cement or other material, except lead and iron, which were used to hold together the exterior ranges or facings. It was so wide that the loaded carts could pass on it in different directions, and it was 40 cubits high, which was about half what he had designed.

The Piræus, as Athens flourished, became the common emporium of all Greece. Hippodamus an architect, celebrated, besides other monuments of his genius, as the inventor of many improvements in house building, was employed to lay out the ground. Five porticoes, which uniting formed the *Long Portico*, were erected by the ports. Here was an *agora* or market-place, and, farther from the sea, another called *Hippodamia*. By the vessels were dwellings for the mariners. A theatre was opened, temples were raised, and the Piræus, which surpassed the city in utility, began to equal it in dignity. The cavities and windings of Munychia, natural and artificial, were filled with houses; and the whole settlement, comprehending Phalerum and the ports of the Piræus, with the arsenals, the storehouses, the famous armoury of which Philo was the architect, and the sheds for 300, and afterwards 400, triremes, resembled the city of Rhodes, which had been planned by the same Hippodamus. The ports, on the commencement of the Peloponnesian war, were secured with chains. Centinels were stationed, and the Piræus was carefully guarded.

The Piræus was reduced with great difficulty by Sylla, who demolished the walls, and set fire to the armoury and arsenals. In the civil war it was in a defenceless condition. Calenus, lieutenant to Cæsar, seized

Piræus,
Piracy.

seized it, invested Athens, and ravaged the territory. Strabo, who lived under the emperors Augustus and Tiberius, observes, that the many wars had destroyed the long walls, with the fortress of Munychia, and had contracted the Piræus into a small settlement by the ports and the temple of Jupiter Saviour. This fabric was then adorned with wonderful pictures, the works of illustrious artists, and on the outside with statues. In the second century, besides houses for triremes, the temple of Jupiter and Minerva remained, with their images in brass, and a temple of Venus, a portico, and the tomb of Themistocles.

The port of the Piræus has been named *Porto Leone*, from the marble lion seen in the chart, and also *Porto Draco*. The lion has been described as a piece of admirable sculpture, 10 feet high, and as reposing on its hinder parts. It was pierced, and, as some have conjectured, had belonged to a fountain. Near Athens, in the way to Eleufis, was another, the posture couchant; probably its companion. Both these were removed to Venice by the famous general Morosini, and are to be seen there before the arsenal. At the mouth of the port are two ruined piers. A few vessels, mostly small craft, frequent it. Some low land at the head seems an incroachment on the water. The buildings are a mean customhouse, with a few sheds; and by the shore on the east side, a warehouse belonging to the French; and a Greek monastery dedicated to St Spiridion. On the opposite side is a rocky ridge, on which are remnants of the ancient wall, and of a gateway towards Athens. By the water-edge are vestiges of building; and going from the customhouse to the city on the right hand, traces of a small theatre in the side of the hill of Munychia.

PIRACY, the crime of robbery and depredation upon the high seas.

By the ancient common law, piracy, if committed by a subject, was held to be a species of treason, being contrary to his natural allegiance; and by an alien, to be felony only: but now, since the statute of treasons, 25 Edw. III. c. 2. it is held to be only felony in a subject. Formerly it was only cognizable by the admiralty courts, which proceed by the rules of the civil law. But, it being inconsistent with the liberties of the nation, that any man's life should be taken away, unless by the judgment of his peers, or the common law of the land, the statute 28 Hen. VIII. c. 15. established a new jurisdiction for this purpose; which proceeds according to the course of the common law.

The offence of piracy, by common law, consists in committing those acts of robbery and depredation upon the high seas, which, if committed upon land, would have amounted to felony there. But, by statute, some other offences are made piracy also: as, by statute 11 and 12 W. III. c. 7. if any natural-born subject commits any act of hostility upon the high seas, against others of his majesty's subjects, under colour of a commission from any foreign power; this, though it would only be an act of war in an alien, shall be construed piracy in a subject. And farther, any commander, or other seafaring person, betraying his trust, and running away with any ship, boat, ordnance, ammunition, or goods; or yielding them up volunta-

rily to a pirate; or conspiring to do these acts; or any person assaulting the commander of a vessel, to hinder him from fighting in defence of his ship; or confining him, or causing or endeavouring to cause a revolt on board; shall, for each of these offences, be adjudged a pirate, felon, and robber, and shall suffer death, whether he be principal, or merely accessory by setting forth such pirates, or abetting them before the fact, or receiving or concealing them or their goods after it. And the statute 4 Geo. I. c. 11. expressly excludes the principals from the benefit of clergy. By the statute 8 Geo. I. c. 24. the trading with known pirates, or furnishing them with ammunition, or fitting out any vessel for that purpose, or in anywise consulting, combining, confederating, or corresponding with them; or the forcibly boarding any merchant vessel, though without seizing or carrying her off, and destroying or throwing any of the goods overboard; shall be deemed piracy: and such accessories to piracy as are described by the statute of king William are declared to be principal pirates; and all pirates convicted by virtue of this act are made felons without benefit of clergy. By the same statutes also, (to encourage the defence of merchant-vessels against pirates), the commanders or seamen wounded, and the widows of such seamen as are slain, in any piratical engagement, shall be entitled to a bounty to be divided among them, not exceeding one fiftieth part of the value of the cargo on board: and such wounded seamen shall be intitled to the pension of Greenwich hospital; which no other seamen are, except only such as have served in a ship of war. And if the commander shall behave cowardly, by not defending the ship, if she carries guns or arms; or shall discharge the mariners from fighting, so that the ship falls into the hands of pirates; such commander shall forfeit all his wages, and suffer six months imprisonment. Lastly, by statute 18 Geo. II. c. 30. any natural born subject or denizen, who in time of war shall commit hostilities at sea against any of his fellow-subjects, or shall assist an enemy on that element, is liable to be tried and convicted as a pirate.

PIRATE, (*παιρατης*, Gr.); a sea-robber, or an armed ship that roams the seas without any legal commission, and seizes or plunders every vessel she meets indiscriminately, whether friends or enemies.

The colours usually displayed by pirates are said to be a black field, with a death's head, a battle-axe, and hour glass. The last instrument is generally supposed to determine the time allowed to the prisoners, whom they take, to consider whether they will join the pirates in their felonious combination, or be put to death, which is often perpetrated in the most cruel manner.

Amongst the most celebrated pirates of the north is recorded Alvilda, daughter of a king of the Goths named *Sypardus*. She embraced this occupation to deliver herself from the violence imposed on her inclination, by a marriage with Alf, son of Sigarus king of Denmark. She dressed herself as a man; and composed her band of rowers, and the rest of her crew, of a number of young women attired in the same manner. Amongst the first of her cruizes, she touched at a place where a company of pirates bewailed the

Piracy,
Pirate.

Pirene
||
Piron.

death of their captain. The strangers were captivated with the agreeable manners of Alvilda, and chose her for their chief. By this reinforcement she became so formidable upon the sea, that prince Alf came to engage her. She sustained his attacks for a considerable time: but, in a vigorous action, Alf boarded her vessel, and having killed the greatest part of her crew, seized the captain, namely herself; whom nevertheless he knew not, because the princess had a casque which covered her visage. Being master of her person, he removed the casque; and in spite of her disguise, instantly recognized her, and offered her his hand in wedlock.

PIRENE, (Pliny); a fountain sacred to the muses, springing below the top of the Acrocorinthus, a high and steep mountain which hangs over Corinth. Its waters were agreeable to drink, (Pausanias); extremely clear, (Strabo); very light, (Athenæus); and pale, (Perfius): having relation either to the grief of Pirene, mother of Cenchrea, from whose tears this fountain arose, (Pausanias); or to the paleness brought on by the too eager pursuits of the muses.

PIROMALLI (Paul), a dominican of Calabria, was sent a missionary into the east. He remained a long time in Armenia, where he had the happiness to bring back to the church many schismatics and Eutychians, and the patriarch himself, who had before thrown every obstacle in his way. He afterwards passed into Georgia and Persia, then into Poland, in quality of Pope Urban VIII.'s nuncio, in order to appease the disturbances which had been occasioned there by the disputes of the Armenians, who were very numerous in that country. Piromalli reunited them in the profession of the same faith, and observance of the same ceremonies. In his return to Italy, he was taken by some Corsairs who carried him prisoner to Tunis. As soon as he was ransomed, he went to Rome, and gave an account of his mission to the pope, who conferred upon him some signal marks of his esteem. His holiness entrusted him with the revival of an Armenian Bible, and sent him again into the east, where he was promoted, in 1655, to the bishopric of Naffivan. After having governed that church for nine years, he returned to Italy, and took the charge of the church of Bassignano, where he died three years after in 1667. His charity, his zeal, and other virtues did honour to the Episcopal office. There are extant of his writings, 1. Some works of Controversy and Theology. 2. Two Dictionaries; the one a Latin-Persian, and the other an Armenian-Latin. 3. An Armenian Grammar. 4. A Directory, which is of great use in correcting Armenian books. All these works equally distinguish him for virtue and for learning.

PIRON (Alexis), whose father was an apothecary, was born at Dijon the 9th of July 1689, where he passed more than 30 years in the idle and destructive dissipation too common to young men. He was at length obliged to quit the place of his nativity, in order to avoid the reproaches of his fellow-citizens, on account of an ode which he had written, and which gave great offence. His relations not being able to give him much assistance, he supported himself at Paris by means of his pen, the strokes of which were as beautiful and fair as those of an engraver. He lived in the house of M. de Bellisle as his secretary, and afterwards with a financier, who did not know that he had a man of ge-

nus under his roof. His reputation as a writer commenced with some pieces which he published for the entertainment of the populace, and which showed strong marks of original invention; but what fully established his character in this way was his comedy intitled *Metromany*, which was the best that had appeared in France since Regnard's *Gamester*. This performance, in five acts, well conducted, replete with genius, wit, and humour, was acted with the greatest success upon the French stage in 1738. The author met with every attention in the capital which was due to a man of real genius, and whose flashes of wit were inexhaustible. We shall insert a few anecdotes of him, which will serve to show his character and turn of mind. In Burgundy the inhabitants of Beaune are called the *Asses of Beaune*. Piron often indulged his satirical disposition at their expence. One day as he was taking a walk in the neighbourhood of that city, he diverted himself with cutting down all the thistles which he met with. When a friend asked him his reason for doing so, he replied, *J'ai à me plaindre des Beaunois; je leur coupe les vivres*, i. e. "I am sorry indeed for the Beaunians; for I am cutting down their food." Being told again that these people would certainly be revenged of him,

Allez, (says he) Allez: je ne crains point leur impuissant courroux;

Et, quand je serois seul, je les batterois tous.

"Get you gone, get you gone: I fear not their feeble revenge; for tho' alone, I should beat them all." Going into a theatre one time where a play was acting, he asked what it was? The Cheats of Scapin, gravely replied a young Beaunian. "Ah! Sir, (says Piron, after thanking him), I took it to be the Cheats of Orestes." In the time of the play, some body addresses the company with "Silence there, gentlemen, we don't hear." "It is not at least (cried Piron) for want of ears." A bishop one day asked Piron, during the disputes about Jansenism, "Did you read my mandate, Mr Piron?" "No, my lord; and you—The conversation turning very warm, the bishop reminded him of the distance which birth and rank had put between them. "Sir (says Piron), I have plainly the superiority over you at this moment; for I am in the right, and you are in the wrong."—Voltaire's *Semiramis* did not meet with a very favourable reception the first time it was acted. The author finding Piron behind the scenes, asked him what he thought of his performance? "I think (replied he) you would have been pleased that I had been the author of it." The performer of the character Ferdinand Cortez (the title of one of Piron's Tragedies) having requested some corrections to be made on the play the first time it was acted, Piron fired at the word *corrections*. The player, who was deputed to wait upon the author with this request, cited the example of Voltaire, who corrected some of his pieces in order to gratify the taste of the public. "The cases are widely different (replied Piron); Voltaire works in chequer-work, and I cast in brass." If this answer be not very modest, we must allow that it does not want wit. He thought himself, if not superior, at least equal to Voltaire. Some person congratulating him on having composed the best comedy of this age, he answered, with more frankness than modesty, "Add too, and the best tragedy." The following verses are well known, in which he says:

Es.

Piron.

Piron,
Pisa.

*En deux mots voulez-vous distinguer & connoître
Le rimeur Dijonnois & le Parisien ?
Le premier ne fut rien, & ne voulut rien être ;
L'autre voulut tout être, & ne fut presque rien.*

We see by these different traits that Piron had a sufficient stock of self-conceit. What helped to increase it, and make him fancy himself superior to the most celebrated of his contemporaries, was, that his company, on account of his original humour, of which he had an uncommon share, was more courted than that of Voltaire, who was otherwise too lively, too captious, and crabbed. But those who have favoured us with an account of his many witticisms in conversation, would have done more honour to his memory if they had passed over such as were either indecent or insipid. A thing often pleases over a glass of wine, which will not give the same satisfaction when it is repeated, especially if, in repeating it, you want to make it appear of some importance. Be that as it may, Piron's mischievous ingenuity was partly the cause which excluded him from the French Academy.—“I could not (said he) make thirty-nine people think as I do, and I could still less think as thirty-nine do.” He called that celebrated society very unjustly *les invalides du bel esprit*, “the invalids of wit;” and yet he often endeavoured to be one of those invalids. His death was hastened by a fall which he got a little before. He died the 21st of January 1773, at the age of 83. He had prepared for himself the following epitaph, in the way of an epigram :

*Ci gît Piron, qui ne fut rien,
Pas même académicien.*

“Here lies Piron, who was nothing, not even an academician.”

His wife Maria Theresa Quenandon, who died in 1751, he describes as a sweet and most agreeable companion. They lived together for several years; and no husband ever discharged his duty with more fidelity and attention.

A collection of his works appeared in 1776, in 7 vol. 8vo, and 9 vol. 12mo. The principal pieces are, *The School of Fathers*; a comedy, acted in 1728 under the title of *Ungrateful Sons*. *Callisthenes*; a tragedy, the subject of which is taken from Justin. *The Mysterious Lover*, a comedy. *Gustavus and Ferdinand Cortez*, two tragedies; some scenes of which discover an original genius, but the versification neither pleases the ear nor affects the heart. *Metromany*, a comedy. *The Courses of Tempe*, an ingenious pastoral, in which the manners both of the town and country are pleasantly drawn. Some odes, poems, fables, and epigrams. In this last kind of poetry he was very successful, and he may be placed after Marot and Rousseau. There was no occasion for loading the public with 7 vols of his works; the half of that number might have sufficed. For, excepting *Metromany*, *Gustavus*, *the Courses of Tempe*, some odes, about 20 epigrams, three or four fables, and some epistles, the rest are but indifferent, and have no claim to any extraordinary merit.

PISA, a large town of Tuscany in Italy, situated on the river Arno, 52 miles from Florence. It was a famous republic, till subdued, first by the duke of Milan, and then by the Florentines in the year 1406. Before it lost its freedom, it is said to have contained near 150,000 inhabitants, but now it has not above 16,000

or 17,000. It was founded, we are told, by the Pisans of Peloponnesus, and afterwards became one of the 12 municipia of Tuscany. Its neighbourhood to Leghorn, which is now the chief port in the Mediterranean, though formerly of little or no note for trade, has contributed greatly to the decay of Pisa, which, however, begins to lift up its head again, under the auspices of the present grand duke, who has made it his winter residence. Between Pisa and Leghorn is a canal 16 Italian miles in length.—Its territory is very fruitful; abounding in corn, wine, and fruit, and fine cattle. The houses are well built, and the streets even, broad, and well paved; but in many places over-run with grass. The university is well endowed, and has able professors, but is not in a very flourishing condition. The exchange is a stately structure, but little frequented. The grand duke's galleys are built, and commonly stationed here. This city is also the principal residence of the order of St Stephen, and the see of an archbishop. The cathedral, a large Gothic pile, contains a great number of excellent paintings and other curiosities. This church is dedicated to St Mary; is very advantageously situated in the middle of a large piazza, and built out of a great heap of wrought marble, such as pillars, pedestals, capitals, cornices, and architraves, part of the spoils which the Pisans took in their eastern expeditions, when the republic was in a flourishing condition. The roof is supported by 76 high marble pillars of different colours, and finely gilt. Both the church and the cupola are covered with lead. The choir is painted by good hands, and the floor is Mosaic work. The brazen doors are curiously wrought with the history of the Old and New Testament, by Bonanno, an ancient statuary. The chapel of St Rainerius is richly adorned with gilt metals, columns of porphyry, and fine paintings. In the middle of the nave of the church you see two brazen tombs, raised upon pillars. The marble pulpit was carved by John Pisano, and the choir by Julian da Majana. Joining thereto is the altar, over which is preserved a hollow globe or vessel of marble, wherein they kept the sacrament for the new baptized, according to the opinion of Father Mabillon. In the square before the church, you see a pillar upon which is the measure of the ancient Roman talent. In the same square with the dome, stands the baptistry, a round fabric supported by stately pillars, and remarkable for a very extraordinary echo.

On the north side of the cathedral is the burying place, called *Campo Santo*, being covered with earth brought from the Holy Land. This burying place is inclosed with a broad portico, well painted, and paved with grave stones. Here are a great many ancient tombs, among the rest that of Beatrix, mother of the countess Mathilda, with marble basso relievos, which the Pisans brought from Greece, where you see the hunt of Meleager, which assisted Nicholas of Pisa in the restoration of sculpture. The walls of the Campo Santo are painted by the best masters of their times. Giotto has drawn six historical pieces of Job; and Andrea Orgagna has given a fine piece of the last judgment. Under the portico there is a decree of the city, ordering the inhabitants to wear mourning a year for the death of Cæsar. Near the church you see a steeple in the form of a cylinder, to which you ascend

Pisa.

by

Pisa
Piscidia.

by 153 steps; it inclines 15 feet on one side, which some ascribe to art, but others to the sinking of the foundation. Its inclination is so great that a plumb-line let fall from the top touches the ground at the distance of almost 15 feet from the bottom. It was built by John of Inspruck and Bonanno of Pisa, in 1174. Near this steeple is a fine hospital, dependent on that of St Maria Nuova in Florence.

The steeple of the church of the Augustinians is also very fine, being an octagon, adorned with pillars, and built by Nicholas of Pisa. In the great market-place there is a statue of Plenty, by Pierino da Vinci. In the church of St Matthew, the painting of the ceiling by the brothers Melani, natives of this city, is an admired performance. The church of the knights of St Stephen, decorated with the trophies taken from the Saracens, is all of marble, with marble steps, and a front adorned with marble statues. In the square there is a statue of Cosmo I. upon a very fine pedestal. Contiguous to the church is the convent or palace of the knights, which is worth seeing, as also the churches Della Madonna and Della Spina; the last of which was built by a beggar, whose figure you may see on the outside of the wall. It is pretended that one of the thorns of the crown which was placed on our Saviour's head is preserved here. Belonging to the university there is a great number of colleges, the chief of which is the Sapienza, where the professors read their public lectures; next to which are the colleges Puteano, Ferdinando, Ricci, and others. Besides the public palace, and that of the grand duke, there are several others with marble fronts, the finest of which is that of Lanfranchi, which, with the rest along the banks of the Arno, makes a very fine appearance. There is here a good dock, where they build the galleys, which are conveyed by the Arno to Leghorn. They have a famous aqueduct in this town, consisting of 5000 arches, which conveys the water from the hills at five miles distance. This water is esteemed the best in Italy, and is carried in fasks to Florence and Leghorn. The neighbouring country produces great store of corn and wine, but the latter is not much esteemed. They have very good butter in this neighbourhood, which is a scarce commodity in Italy. The city for its defence has a moat, walls, a castle, fort, and citadel; the last of which is a modern work. The Arno is of a considerable breadth here, and has three bridges over it, one of them of marble: two leagues below the town it falls into the sea. The physic-garden is very spacious, contains a great number of plants, and is decorated with water-works: over the door leading into it are these words, *Hic Argus sed non Briareus esto*: i. e. Employ the eyes of Argus, but not the hands of Briareus. The air is said to be unwholesome here in summer, on account of the neighbouring morasses. Many buffaloes are bred in the neighbouring country, and their flesh is commonly eaten. Between Pisa and Lucca are hot baths. E. Long. 10. 17. N. Lat 43.

43.

PISCARY, in our ancient statutes, the liberty of fishing in another man's waters.

PISCES, in astronomy, the 12th sign or constellation of the zodiac.

PISCIDIA, a genus of the decandria order, belonging to the diadelphia class of plants. There are

two species, viz. 1. The erythrina, or dog-wood tree. This grows plentifully in Jamaica, where it rises to the height of 25 feet or more; the stem is almost as large as a man's body, covered with a light-coloured smooth bark, and sending out several branches at the top without order; the leaves are about two inches long, winged, with oval lobes. The flowers are of the butterfly kind, and of a dirty white colour; they are succeeded by oblong pods, with four longitudinal wings, and jointed between the cells which contain the seeds. 2. The Carthaginensis, with oblong oval leaves, is also a native of the West Indies. It differs from the former only in the shape and consistence of the leaves, which are more oblong and stiffer; but in other respects they are very similar. Both species are easily propagated by seeds; but require artificial heat to preserve them in this country.—The negroes in the West Indies make use of the bark of the first species to intoxicate fish. When any number of gentlemen have an inclination to divert themselves with fishing, or, more properly speaking, with fish-hunting, they send each of them a negro-slave to the woods, in order to fetch some of the bark of the dog-wood tree. This bark is next morning pounded very small with stones, put into old sacks, carried into rocky parts of the sea, steeped till thoroughly soaked with salt-water, and then well squeezed by the negroes to express the juice. This juice immediately colours the sea with a reddish hue; and, being of a poisonous nature, will in an hour's time make the fishes, such as groopers, rock-fish, old wives, Welchmen, &c. so drunk or intoxicated, as to swim on the surface of the water, quite heedless of the danger: the gentlemen then send in their negroes, who pursue, both swimming and diving, the poor inebriated fishes, till they catch them with their hands; their masters in mean time standing by, on high rocks, to see the pastime.

It is remarkable, that though this poison kills millions of the small fry, it has never been known to impart any bad quality to the fish which have been caught in consequence of the intoxication.

The wood of this tree, although pretty hard, is only fit for fuel; and even for this purpose the negroes very seldom, if ever, employ it, on account of its singular quality just mentioned. The bark is rough, brown, and thick; the tree sends forth a considerable number of branches, and is well clothed with leaves, which resemble those of the pea, are thick, cottony, and of a deep green. The bark used for the above-mentioned purpose is chiefly that of the roots.

PISCINA, in antiquity, a large basin in a public place or square, where the Roman youth learned to swim, and which was surrounded with a high wall, to prevent filth from being thrown into it.—This word is also used for a lavatory among the Turks, placed in the middle court of a mosque or temple, where the Mussulmen wash themselves before they offer their prayers.

PISISTRATUS, an Athenian who early distinguished himself by his valour in the field, and by his address and eloquence at home. After he had rendered himself the favourite of the populace by his liberality and by the intrepidity with which he had fought their battles, particularly near Salamis, he resolved to make himself master of his country. Every thing seemed

Piscidia
Pisistratus.

Bibliotheca
Classica by
Lempriere.

Pisistratus. ed favourable to his ambitious views; but Solon alone, who was then at the head of affairs, and who had lately enforced his celebrated laws, opposed him, and discovered his duplicity and artful behaviour before the public assembly. Pisistratus was not disheartened by the measures of his relation Solon, but he had recourse to artifice. In returning from his country-house, he cut himself in various places; and after he had exposed his mangled body to the eyes of the populace, deplored his misfortunes, and accused his enemies of attempts upon his life, because he was the friend of the people, the guardian of the poor, and the reliever of the oppressed, he claimed a chosen body of 50 men from the populace to defend his person in future from the malevolence and the cruelty of his enemies. The unsuspecting people unanimously granted his request, though Solon opposed it with all his influence; and Pisistratus had no sooner received an armed band on whose fidelity and attachment he could rely, than he seized the citadel of Athens, and made himself absolute. The people too late perceived their credulity; yet, though the tyrant was popular, two of the citizens, Megacles and Lycurgus, conspired together against him, and by their means he was forcibly ejected from the city. His house and all his effects were exposed to sale; but there was found in Athens only one man who would buy them. The private dissensions of the friends of liberty proved favourable to the expelled tyrant; and Megacles, who was jealous of Lycurgus, secretly promised to restore Pisistratus to all his rights and privileges in Athens, if he would marry his daughter. Pisistratus consented; and by the assistance of his father-in-law, he was soon enabled to expel Lycurgus, and to re-establish himself. By means of a woman called *Phya*, whose shape was tall, whose features were noble and commanding, he imposed upon the people, and created himself adherents even among his enemies. *Phya* was conducted through the streets of the city, and showing herself subservient to the artifice of Pisistratus, she was announced as *Minerva*, the goddess of wisdom, and the patroness of Athens, who was come down from Heaven to re-establish her favourite Pisistratus in a power which was sanctioned by the will of Heaven, and favoured by the affection of the people. In the midst of his triumph, however, Pisistratus found himself unsupported; and some time after, when he repudiated the daughter of Megacles, he found that not only the citizens, but even his very troops, were alienated from him by the influence, the intrigues, and the bribery of his father-in-law. He fled from Athens where he no longer could maintain his power, and retired to *Eubœa*. Eleven years after he was drawn from his obscure retreat, by means of his son *Hippias*, and he was a third time received by the people of Athens as their master and sovereign. Upon this he sacrificed to his resentment the friends of Megacles, but he did not lose sight of the public good, and while he sought the aggrandizement of his family, he did not neglect the dignity and the honour of the Athenian name. He died about 528 years before the Christian era, after he had enjoyed the sovereign power at Athens for 33 years, and he was succeeded by his son *Hipparchus*. Pisistratus claims our admiration for his justice, his liberality, and his moderation. If he was dreaded and detested as a tyrant, the Athenians loved and respect-

ed his private virtues and his patriotism as a fellow-citizen; and the opprobrium which generally falls on his head may be attributed not to the severity of his administration, but to the republican principles of the Athenians, who hated and exclaimed against the moderation and equity of the mildest sovereign, while they flattered the pride and gratified the guilty desires of the most tyrannical of their fellow subjects. Pisistratus often refused to punish the insolence of his enemies; and when he had one day been virulently accused of murder, rather than inflict immediate punishment upon the man who had criminated him, he went to the *areopagus*, and there convinced the Athenians that the accusations of his enemies were groundless, and that his life was irreproachable. It is to his labours that we are indebted for the preservation of the poems of *Homer*; and he was the first, according to *Cicero*, who introduced them at Athens in the order in which they now stand. He also established a public library at Athens; and the valuable books which he had diligently collected were carried into Persia when *Xerxes* made himself master of the capital of Attica. *Hipparchus* and *Hippias* the sons of Pisistratus, who have received the name of *Pisistratidæ*, rendered themselves as illustrious as their father; but the flames of liberty were too powerful to be extinguished. The *Pisistratidæ* governed with great moderation, but the name of tyrant or sovereign was insupportable to the Athenians. Two of the most respectable of the citizens, called *Harmodius* and *Aristogiton*, conspired against them, and *Hipparchus* was dispatched in a public assembly. This murder was not, however, attended with any advantages; and though the two leaders of the conspiracy, who have been celebrated through every age for their patriotism, were supported by the people, yet *Hippias* quelled the tumult by his uncommon firmness and prudence, and for a while preserved that peace in Athens which his father had often been unable to command. This was not long to continue. *Hippias* was at last expelled by the united efforts of the Athenians and of their allies, and he left Attica, when he found himself unable to maintain his power and independence. The rest of the family of Pisistratus followed him in his banishment; and after they had refused to accept the liberal offers of the princes of *Thessaly*, and the king of *Macedonia*, who wished them to settle in their respective territories, the *Pisistratidæ* retired to *Sigæum*, which their father had in the summit of his power conquered and bequeathed to his posterity. After the banishment of the *Pisistratidæ*, the Athenians became more than commonly jealous of their liberty, and often sacrificed the most powerful of their citizens, apprehensive of the influence which popularity and a well-directed liberality might gain among a fickle and unsettled populace. The *Pisistratidæ* were banished from Athens about 18 years after the death of Pisistratus.

PISMIREs, are a kind of insects very common in Africa; of which there is so great a variety, and such innumerable swarms, that they destroy not only the fruits of the ground but even men and beasts in so little a time as one single night; and would, without all doubt, prove more fatally destructive to the inhabitants, were they not so happily destroyed by a proportionable number of monkeys, who greedily ferret and devour them.

Pisistratus,
Pismires.

Piso.

them. For a further account of these, and some other grievous plagues with which the far greater part of the vast continent of Africa is afflicted, particularly that most horrid visitation of locusts, which seldom fail a year of laying waste some of the provinces, see GAYLUS, p. 161.

PISO (Lucius Calpurnius), surnamed *Frugi* on account of his frugality, was descended of the illustrious family of the Pisos, which gave so many great men to the Roman republic. He was tribune of the people in the year 149 before Christ, and afterwards consul. During his tribuneship, he published a law against the crime of concussion or extortion, intitled *Lex Calpurnia de pecuniis repetundis*. He happily ended the war in Sicily. To reward the services of one of his sons, who had distinguished himself in that expedition, he left him by his will a golden crown, weighing 20 pounds. Piso joined to the qualities of a good citizen the talents of a lawyer, an orator, and historian.

Piso (Caius Calpurnius), a Roman consul in the year 67 before Christ, was author of the law which forbid canvassing for public offices, intitled *Lex Calpurnia de ambitu*. He displayed all the firmness worthy of a consul in one of the most stormy periods of the republic. The Roman people, deceived by the flattery of Marcus Palicanus, a turbulent and seditious fellow, were on the eve of loading themselves with the greatest disgrace, by putting the supreme authority into the hands of this man, who deserved punishment rather than honours. The tribunes of the people, by their harangues, inflamed the blind fury of the multitude, already sufficiently mutinous of themselves. In this situation, Piso mounted the rostrum, and being asked if he would declare Palicanus consul, in case the suffrages of the people should concur in the nomination, he instantly replied, that "he did not think the republic was yet involved in such darkness and despair as to be capable of committing so infamous an action." Being afterwards strongly and repeatedly called upon to say, "what he would do, if the thing should happen?" his answer was, "No, I would not name him." By this firm and laconic answer he deprived Palicanus of the dignity to which he aspired. Piso, according to Cicero, was not possessed of a quick conception, but he thought maturely, and with judgment, and, by a proper firmness, he appeared to be an abler man than he really was.

Piso (Cneius Calpurnius), was consul in the reign of Augustus, and governor of Syria under Tiberius, whose confident he was. It is said, that by the order of this emperor he caused Germanicus to be poisoned. Being accused of that crime, and seeing himself abandoned by every body, he laid violent hands on himself in the 20th year of our Lord. He was a man of insupportable pride and excessive violence. Some instances of his wicked cruelty have been handed down to us. Having given orders in the heat of his passion to conduct to punishment a soldier, as guilty of the death of one of his companions, because he had gone out of the camp with him and returned without him, no prayers or intreaty could prevail with Piso to suspend the execution of this sentence until the affair should be properly investigated. The soldier was led without the entrenchments, and had already presented his head to receive the fatal stroke, when his compa-

nion whom he was accused of having killed made his appearance again. Whereupon the centurion, whose office it was to see the sentence executed, ordered the executioner to put up his sword into the scabbard. Those two companions, after embracing each other, are conducted to Piso, amidst the acclamations of the whole army, and a prodigious crowd of people. Piso, foaming with rage, ascends his tribune, and pronounces the same sentence of death against the whole three, without excepting the centurion who had brought back the condemned soldier, in these terms: "You I order to be put to death because you have been already condemned; you, because you have been the cause of the condemnation of your comrade; and you, because having got orders to put that soldier to death, you have not obeyed your prince."

PISSASPHALTUM, EARTH-PITCH; a fluid, opaque, mineral body, of a thick consistence, strong smell, readily inflammable, but leaving a residuum of greyish ashes after burning. It arises out of the cracks of the rocks, in several places in the island of Sumatra, and some other places in the East Indies, where it is much esteemed in paralytic disorders. There is a remarkable mine of it in the island of Bua, (see BUA), of which the following curious description is given us by the Abbé Fortis. "The island is divided into two promontories between the north and west, crossing over the top of the latter, which is not half a mile broad, and descending in a right line towards the sea, one is conducted to a hole well known to the inhabitants. This hole extends not much above 12 feet, and from its bottom above 25 feet perpendicular, arise the marble strata which sustain the irregular masses that surround the top of the mountain.

"The place seemed to me (continues our author), so worthy of observation, that I caused a drawing of it to be taken. The hole AAA is dug out of an irregular stratum of argillaceous sandy earth, in some parts whitish, and in others of a greenish colour; part of it is half petrified, and full of numismata of the largest kind, lenticulares, and fragments, with here and there a small branch of madreporites, and frequently of those other fossil bodies called by Gesner *cornua ammonis candida, minima, &c.* The mass B is fallen from the height of the rock, and lies isolated. The excavation, made by some poor man in the softer matter, reaches a little below the extremity CC of the stratum DD. This is separated by the line EE from the stratum FF, which is of hard common marble, with marine bodies without flints. The upper part aa is of hard lenticular stone, interspersed with flints full of lenticulares. The mass H does not discover the divisions of its strata on the outside, and transpires very small drops of pissasphaltum, scarcely discernible; but the tears III of the same matter, which flow from the fissures and chinks of the whitish stratum DD, are very observable. They come out most abundantly when the sun falls on the marble rock in the heat of the day. This pissasphaltum is of the most perfect quality, black and shining like the *bitumen Judaicum*; very pure, odorous, and cohesive. It comes out almost liquid, but hardens in large drops when the sun sets. On breaking many of these drops on the spot, I found that almost every one of them had an inner cavity full of very clear water.

Plate
CCCXCVII.

"The

Pissasphaltum, "The greatest breadth of the tears that I saw was two inches, and the common breadth is half an inch. The chinks and fissures of the marble, from whence this bituminous pitch transudes, are not more than the thickness of a thread; and for the most part are so imperceptible, that were it not for the pitch itself, whereby they are blackened, they could not by any means be distinguished by the naked eye. To the narrowness of these passages is, no doubt, in part owing the small quantity of pissasphaltum that transpires."

After some conjectures about the origin of this mine, our author proceeds to inform us that the pissasphaltum of Bua is correspondent to that fossil production which by Hasselquist, in his Travels, is called *mumia minerale*, and *mumia nativa Persiana* by Kempfer, which the Egyptians made use of to embalm their kings (A). It is found in a cave of mount Caucasus, which is kept shut, and carefully guarded by order of the king of Persia. One of the qualities assigned by M. Linnæus to the finest bitumen is to smoke when laid on the fire, as ours does, emitting a smell of pitch not disagreeable. He believes it would be very good for wounds, as the oriental mumia is, and like the pitch of Castro, which is frequently used by the Roman surgeons for fractures, contusions, and in many external applications. See MINERALOGY.

PISSELAËUM INDICUM, *Barbadoes Tar*; a mineral fluid of the nature of the thicker bitumens, and of all others the most approaching, in appearance, colour, and consistence, to the true pissasphaltum, but differing from it in other respects. It is very frequent in many parts of America, where it is found trickling down the sides of mountains in large quantities, and sometimes floating on the surface of the waters. It has been greatly recommended internally in coughs and other disorders of the breast and lungs.

PISTACIA, *TURPENTINE-TREE*, *Pistachia-nut* and *Mastich-tree*; a genus of the pentandria order, belonging to the dioecia class of plants. There are nine species; of which the most remarkable are, 1. The terebinthus, or pistachia-tree. This grows naturally in Arabia, Persia, and Syria, whence the nuts are annually brought to Europe. In those countries it grows to the height of 25 or 30 feet: the bark of the stem and old branches is of a dark russet colour, but that of the young branches is of a light brown. These are garnished with winged leaves, composed sometimes of two, at other times of three, pair of lobes, terminated by an odd one: these lobes approach towards an oval shape, and their edges are turned backward; and these, when

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bruised, emit a smell similar to that of the shell of the Pistacia. Some of these trees produce male and others female flowers, and some have both male and female on the same tree. The male flowers come out from the sides of the branches in loose bunches or catkins. They have no petals, but five small stamina crowned by large four-cornered summits filled with farina; and when this is discharged, the flowers fall off. The female flowers come out in clusters from the sides of the branches: they have no petals, but a large oval germen supporting three reflexed styles, and are succeeded by oval nuts. 2. The lentiscus, or common mastich-tree, grows naturally in Portugal, Spain, and Italy. Being an evergreen, it has been preserved in this country in order to adorn the green-houses. In the countries where it is a native, it rises to the height of 18 or 20 feet, covered with a grey bark on the stem; but the branches, which are very numerous, are covered with a reddish-brown bark, and are garnished with winged leaves, composed of three or four pair of small spear-shaped lobes, without an odd one at the end. 3. The orientalis, or true mastich-tree of the Levant, from which the mastich is gathered, has been confounded by most botanical writers with the lentiscus, or common mastich tree, above described, though there are considerable differences between them. The bark of the tree is brown; the leaves are composed of two or three pair of spear-shaped lobes, terminated by an odd one: the outer lobes are the largest; the others gradually diminish, the innermost being the least. These turn of a brownish colour towards the autumn, when the plants are exposed to the open air; but if they are under glasses, they keep green. The leaves continue all the year, but are not so thick as those of the common sort, nor are the plants so hardy.

Culture. The first species is propagated by its nuts; which should be planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot-bed to bring up the plants: when these appear, they should have a large share of air admitted to them, and by degrees they should be exposed to the open air, which at last they will bear in all seasons, though not without great danger of being destroyed in severe winters. The second sort is commonly propagated by laying down the branches, though it may also be raised from the seed in the manner already directed for the pistachia-nut tree: and in this manner also may the true mastich-tree be raised. But this being more tender than any of the other sorts, requires to be constantly sheltered in winter, and to have a warm situation in summer.

5 F

Pistachia

(A) "Mumiaki, or native Persian mummy. It proceeds from a hard rock in very small quantity. It is a bituminous juice, that transudes from the stony superficies of the hill, resembling in appearance coarse shoemakers wax, as well in its colour as in its density and ductility. While adherent to the rock it is less solid, but is formed by the warmth of the hands. It is easily united with oil, but repels water; it is quite void of smell, and very like in substance to the Egyptian mummy. When laid on burning coals, it has the smell of sulphur tempered a little with that of naphtha, not disagreeable. There are two kinds of this mummy; the one is valuable for its scarcity and great activity. The native place of the best mummy is far from the access of men, from habitations, and from springs of water, in the province of Daraab. It is found in a narrow cave, not above two fathoms deep, cut like a well out of the mass, at the foot of the ragged mountain Caucasus." — Kempfer. *Aman. Pers.*

This description agrees perfectly with the pissasphaltum or fossil mummy of Bua, differing only in the privation of smell, which it is difficult to imagine is totally wanting in the Persian mummy.

Pistil

Piston.

Pistachia nuts are moderately large, containing a kernel of a pale greenish colour, covered with a reddish skin. They have a pleasant, sweet, unctuous taste, resembling that of almonds; and they abound with a sweet and well-tasted oil, which they yield in great abundance on being pressed after bruising them: they are reckoned amongst the analeptics, and are wholesome and nutritive, and are by some esteemed very proper to be prescribed by way of restoratives, eaten in small quantity, to people emaciated by long illness.

PISTIL, among botanists, the little upright column which is generally found in the centre of every flower. According to the Linnæan system, it is the female part of generation, whose office is to receive and secrete the pollen, and produce the fruit. It consists of three parts, viz. germen, stylus, and stigma. See **BOTANY**, p. 434, and p. 454, 2d columns.

PISTOIA is a city of Italy, in the duchy of Tuscany, situated on the river Stella, in a beautiful plain near the foot of the Apennine mountains. By Pliny it is called *Pistorium*, and is said to have been once a Roman colony. At present it is a bishop's see, suffragan of Florence. The streets are broad and regular, the houses tolerably well built, but poorly inhabited for want of trade. Formerly it was an independent republic, but since it was subdued by the Florentines in 1200, it has been in a declining condition. The cathedral has a very handsome cupola, and a magnificent staircase to ascend to it. In the chapel dedicated to St James, where his relics are preserved, the walls are almost covered with plates of silver. Here are four marble statues of very good workmanship. The marble pulpit, the basso-relievos, the vessel that holds the holy water, and the square steeple, are the work of John Pisano. The Jesuits have a very fine college, and the Franciscans, Dominicans, and Augustinians, good churches. In the church of Madonna dell' Umiltà there are two statues, one of Leo X. and the other of Clement VII. The public palace, situated in a large square, is a handsome building; several of the nobility have also very good houses. In the neighbouring mountains, called by the name of Pistoia, there are many large villages, the chief of which is that of S. Marcello, belonging to the family of Cartoli. These mountains are a part of the Apennines, and border on the territory of Bologna and the county of Vernio; higher up is the source of the river Reno. The country about Pistoia, especially towards Florence, is exceeding fertile and delightful, covered with all sorts of fruits, corn, wine, &c. and containing a vast number of little towns, wealthy villages, and country seats, so as to be reckoned the richest and most beautiful in all Tuscany. It is about 20 miles N. W. of Florence, and 30 N. E. of Pisa. E. Long. 11. 29. N. Lat. 43. 55.

PISTOL, the smallest piece of fire-arms, borne at the saddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin, struck in Spain and in several parts of Italy, Switzerland, &c.—The pistole has its augmentations and diminutions, which are quadruple pistoles, double pistoles, and half pistoles. See *MONEY-Table*.

PISTON, in pump-work, is a short cylinder of metal or other solid substance, fitted exactly to the cavity of the barrel or body of the pump. See *HYDROSTATICS*, sect. v.

PISTORIUS (John), born at Nidda in 1546, applied himself at first to the study of medicine, and was admitted a doctor with applause; but his prescriptions not being attended with all the success which he expected, he quitted that profession, and studied the law. His merit procured him the appointment of counsellor to Ernest Frederick margrave of Bade-Dourlach. He had embraced the Protestant religion; but some time after he changed his opinion, and returned to the communion of the church of Rome. He became afterwards a doctor of divinity, one of the emperor's counsellors, provost of the cathedral of Breslaw, and domestic prelate to the abbot of Fulda. We have of his writings, 1. *Several Controversial Tracts against the Lutherans*. 2. *Artis Cabalisticæ Scriptores*, printed at Bale 1587; a scarce and curious collection. 3. *Scriptores rerum Polonicarum*. 4. *Scriptores de rebus Germanicis*, in 3 vols. folio, from 1603 to 1613. This is a curious and scarce performance, but might have been better digested. The author died in 1608, at the age of 52.

PISUM, PEASE; a genus of the decandria order, belonging to the diadelphia class of plants. The species are, 1. The sativum, or greater garden-pea, whose lower stipulæ are roundish, indented, with taper foot-stalks, and many flowers on a foot-stalk. 2. The humile, or dwarf pea, with an erect branching stalk, and leaves having two pair of round lobes. 3. The umbellatum, rose, or crown-pea, with four pointed acute stipuli, and foot-stalks bearing many flowers, which terminate the stalks. 4. The maritimum, or sea-pea, with foot-stalks which are plain on their upper side, an angular stalk, arrow-pointed stipulæ, and foot-stalks bearing many flowers. 5. The Americanum, commonly called *Cape-Horn pea*, with an angular trailing stalk, whose lower leaves are spear-shaped, sharply indented, and those at the top arrow-pointed. 6. The ochrus, with membranaceous running foot-stalks, having two leaves and one flower upon a foot-stalk.

There is a great variety of garden-pease now cultivated in Britain, which are distinguished by the gardeners and seedsmen, and have their different titles; but as great part of these have been seminal variations, so if they are not very carefully managed, by taking away all those plants which have a tendency to alter before the seeds are formed, they will degenerate into their original state: therefore all those persons who are curious in the choice of their seeds, look carefully over those which they design for seeds at the time when they begin to flower, and draw out all the plants which they dislike from the other. This is what they call *roguing their pease*; meaning hereby the taking out all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which, they always do it before the flowers open. By thus diligently drawing out the bad, reserving those which come earliest to flower, they have greatly improved their pease of late years, and are constantly endeavouring to get forwarder varieties; so that it would be to little purpose in this place to attempt giving a particular account of all the varieties now cultivated: therefore we shall only mention the names by which they are commonly known, placing them according to their time of coming to the table, or gathering for use.

Pistorius,
Pisum.

Pisum.

The golden hotspur.	Nonpareil.
The Charlton.	Sugar dwarf.
The Reading hotspur.	Sickle pea.
Master's hotspur.	Marrowfat.
Essex hotspur.	Rose or crown pea.
The dwarf pea.	Rouncival pea.
The sugar pea.	Gray pea.
Spanish Morotto.	Pig pea; with some others.

The English sea-pea is found wild upon the shore in Sussex and several other counties in England, and is undoubtedly a different species from the common pea.

The fifth species hath a biennial root, which continues two years. This was brought from Cape Horn by Lord Anson's cook, when he passed that Cape, where these pease were a great relief to the sailors. It is kept here as a curiosity, but the pease are not so good for eating as the worst sort now cultivated in Britain. It is a low trailing plant; the leaves have two lobes on each foot-stalk: those below are spear-shaped, and sharply indented on their edges; but the upper leaves are small, and arrow-pointed. The flowers are blue, each foot-stalk sustaining four or five flowers; the pods are taper, near three inches long; and the seeds are round, about the size of tares.

The sixth sort is annual. This grows naturally among the corn in Sicily and some parts of Italy, but is here preserved in botanic gardens for the sake of variety. It hath an angular stalk, rising near three feet high; the leaves stand upon winged foot-stalks, each sustaining two oblong lobes. The flowers are of a pale yellow colour, shaped like those of the other sort of pea, but are small, each foot-stalk sustaining one flower; these are succeeded by pods about two inches long, containing five or six roundish seeds, which are a little compressed on their sides. These are by some persons eaten green; but unless they are gathered very young, they are coarse, and at best not so good as the common pea. It may be sown and managed in the same way as the garden pea.

We shall now proceed to set down the method of cultivating the several sorts of garden pease, so as to continue them throughout the season.

It is a common practice with the gardeners near London to raise pease upon hot-beds, to have them very early in the spring; in order to which, they sow their pease upon warm borders, under walls or hedges, about the middle of October; and when the plants come up, they draw the earth up gently to their stems with a hoe, the better to protect them from frost. In these places they let them remain until the latter end of January, or the beginning of February, observing to earth them up from time to time as the plants advance in height (for the reasons before given); as also to cover them in very hard frost with pease-haulm, straw, or some other light covering, to preserve them from being destroyed; they then make a hot-bed (in proportion to the quantity of pease intended), which must be made of good hot dung, well prepared and properly mixed together, that the heat may not be too great. The dung should be laid for two or three feet thick, according as the beds are made earlier or later in the season; when the dung is equally levelled, then the earth (which should be light and fresh, but not over rich) must be laid thereon about six or eight inches thick, laying it equally all over the bed. This being done, the frames

Pisum.

(which should be two feet high on the back side, and about 14 inches in front) must be put on, and covered with glasses; after which it should remain three or four days, to let the steam of the bed pass off before you put the plants therein, observing every day to raise the glasses to give vent for the rising steam to pass off; then, when you find the bed of a moderate temperature for heat, you should, with a trowel, or some other instrument, take up the plants as carefully as possible to preserve the earth to their roots, and plant them into the hot-bed in rows about two feet asunder, and the plants about an inch distant from each other in the rows, observing to water and shade them until they have taken root; after which you must be careful to give them air at all times when the season is favourable, otherwise they will draw up very weak, and be subject to grow mouldy and decay. You should also draw the earth up to the shanks of the plants as they advance in height, and keep them always clear from weeds. The water they should have must be given them sparingly; for if they are too much watered, it will cause them to grow too rank, and sometimes rot off the plants at their shanks just above ground. When the weather is very hot, you should cover the glasses with mats in the heat of the day, to screen them from the violence of the heat of the sun, which is then too great for them: but when the plants begin to fruit, they should be watered oftener, and in greater plenty than before; for by that time the plants will have nearly done growing, and the often refreshing them will occasion their producing a greater plenty of fruit.

The sort of pea which is generally used for this purpose is the dwarf; for all the other sorts ramble too much to be kept in frames: the reason for sowing them in the common ground, and afterwards transplanting them on a hot-bed, is to check their growth, and cause them to bear in less compass; for if the seeds were sown upon a hot-bed, and the plants continued thereon, they would produce such luxuriant plants as could not be contained in the frames, and would bear but little fruit.

The next sort of pea which is sown to succeed those on the hot bed is the hotspur; of which there are reckoned several varieties, as the golden hotspur, the Charlton hotspur, the Master's hotspur, the Reading hotspur, and some others; which are very little differing from each other, except in their early bearing, for which the golden and Charlton hotspurs are chiefly preferred; though if either of these sorts are cultivated in the same place for three or four years, they are apt to degenerate, and be later in fruiting; for which reason, most curious persons procure their seeds annually from some distant place; and in the choice of these seeds, if they could be obtained from a colder situation and a poorer soil than that in which they are to be sown, it will be much better than on the contrary, and they will come earlier in the spring.

These must also be sown on warm borders, towards the latter end of October; and when the plants are come up, you should draw the earth up to their shanks, and treat them in every other respect as above-directed.

In the spring you must carefully clear them from weeds, and draw some fresh earth up to their stems; but do not raise it too high up to the plants, lest by

Pisum

burying their leaves you should rot their stems, as is sometimes the case, especially in wet seasons. You should also observe to keep them free from vermin, which, if permitted to remain amongst the plants, will increase so plentifully as to devour the greatest part of them. The chief of the vermin which infest pease are slugs, which lie all the day in the small hollows of the earth, near the stems of the plants, and in the night-time come out and make terrible destruction of the pease; and these chiefly abound in wet soils, or where a garden is neglected and over-run with weeds: therefore you should make the ground clear every way round the pease to destroy their harbours; and afterwards in a fine mild morning very early, when these vermin are got abroad from their holes, you should strew a quantity of lime, which should be strewed over the ground pretty thick, which will destroy the vermin wherever it happens to fall upon them, but will do very little injury to the pease, provided it be not scattered too thick upon them.

If this crop of pease succeeds, it will immediately follow these on the hot-bed; but for fear this should miscarry, it will be proper to sow two more crops at about a fortnight or three weeks distance from each other, so that there may be the more chances to succeed. This will be sufficient till the spring of the year, when you may sow several more crops of these pease at a fortnight distance from each other. The late sowings will be sufficient to continue the early sort of pease through the season; but it will be proper to have some of the large sort to succeed them for the use of the family: in order to which, you should sow some of the Spanish Morotto, which is a great bearer and a hardy sort of pea, about the middle of February, upon a clear open spot of ground. These must be sown in rows about four feet asunder, and the pease should be dropped in the drills about an inch distance, covering them about two inches deep with earth, being very careful that none of them lie uncovered, which will draw the mice, pigeons, or rooks, to attack the whole spot; and it often happens, by this neglect, that a whole plantation is devoured by these creatures; whereas, when there are none of the pease left in sight, they do not easily find them out.

About a fortnight after this you should sow another spot, either of this sort or any other large sort of pea, to succeed these; and then continue to repeat sowing once a fortnight, till the middle or latter end of May; only observing to allow the marrowfats, and other very large sorts of pease, at least four feet and a half between row and row; and the rose-pea should be allowed at least eight or ten inches distance plant from plant in the rows; for these grow very large, and if they have not room allowed them, they will spoil each other by drawing them up very tall, and will produce no fruit.

When the plants come up, the earth should be drawn up to their shanks (as was before directed), and the ground kept entirely clear from weeds; and when the plants are grown eight or ten inches high, you should stick some brushwood into the ground close to the pease for them to ramp upon, which will support them from trailing upon the ground, which is very apt to rot the growing sorts of pease, especially in wet seasons; besides, by thus supporting them, the air can freely pass between them, which will preserve the blossoms from

falling off before their time, and occasion them to bear much better than if permitted to lie upon the ground, and there will be room to pass between the rows to gather the pease when they are ripe.

The dwarf sorts of pease may be sown much closer together than those before-mentioned; for these seldom rise above a foot high, and rarely spread above half a foot in width, so that these need not have more room than two feet row from row, and not above an inch asunder in the rows. These will produce a good quantity of pease, provided the season be not over dry; but they seldom continue long in bearing, so that they are not so proper to sow for the main crop when a quantity of pease is expected for the table, their chief excellency being for hot-beds, where they will produce a greater quantity of pease (provided they are well-managed) than if exposed to the open air, where the heat of the sun soon dries them up.

The large growing sorts may be cultivated for the common use of the family, because these will produce in greater quantities than the other, and will endure the drought better; but the early kind are by far the sweeter-tasted pease.

The best of all the large kinds is the marrowfat, which, if gathered young, is a well-tasted pea; and this will continue good through the month of August, if planted on a strong soil.

The gray and other large winter-pease are seldom cultivated in gardens, because they require a great deal of room, but are usually sown in fields. For the proper method of managing them, see AGRICULTURE, n^o 150.

In the *Museum Rusticum*, Vol. I. p. 109. we find the following method of preparing pease for hog-meat, which we shall give in the words of the ingenious farmer who communicated it.

"A few years ago (says he), I had a plentiful crop of pease on a ten acre piece, which lies near my house: when they were full podded and nearly ripe, I had them hooked in the usual manner; but before I could get them in, there came a heavy shower of rain which wetted them through and through; and the dull heavy weather, with frequent showers which followed, prevented their drying for a considerable time.

"I caused the wads to be from time to time turned, to prevent the haulm from rotting; and at length a few days sunshine dried them enough to be inned; for as they lay hollow, the wind was greatly assistant to the operation.

"Before I got them in, on examining some of the pods, I found that the pease were all sprouted to a considerable length: this was what I had expected, as I gave my crop over for lost, till after a little recollection, as the weather still continued fine, I determined to thresh them in the field.

"This was accordingly done; and the corn, after it was cast and riddled to separate it from the rubbish, was dried on my malt-kiln.

"When this operation was over, I began to reflect in what manner I should dispose of my pease, being sensible that they could not be proper for seed, and standing no chance of disposing of them to any advantage in the market.

"At length, as it was then a time of war, and of course there was a great demand for pork for the use of the navy, I determined to buy a considerable number

Pisum.

Pisum,
Pit-coal.

her of lean hogs, that I might by their means consume this crop on my own premises, and in that manner make the most of it.

"My expectations were more than answered; for I found, by repeated experience, that three bushels of the pease I have mentioned went nearly as far in fattening the hogs I bought as four bushels got in dry and hard in the manner usually practised.

"This discovery I made several years ago, and it has turned out to my advantage; for since that time I have been quite indifferent as to the weather in which my pease are hooked, being rather better pleased, as far as relates to them, with wet than dry weather; but if the weather happens to be dry at the time they are ripe, I always cause as many as I want for feeding my hogs, which are not a few in a year, to be regularly malted in the same manner nearly as my barley: this management has of late succeeded very well with me, and I therefore intend to continue it.

"Besides feeding my hogs with these malted pease, I have often given them to my horses, with which they agree very well, and are heartening food.

"Turkeys will fatten apace on them also, and be fine meat.

"I have applied my malted pease to many other uses, which I have not at present time to enumerate: but were they only used for feeding hogs and horses, it is still worth while to prepare some in this manner every year."

PIT-COAL, or STONE-COAL. See COAL and LITHANTHRAX.

Mr Bertrand, in his *Oryctologic Dictionary*, reduces all kinds of coals to six general classes, viz. 1. Lithanthrax ligneus; 2. Petroflus; 3. Terrestris; 4. Piceus; 5. Fissilis; 6. Mineralifatus. He says, that the Scots coals are heavier, and burn not so well as those of Newcastle; that those of Liege burn quicker; and those from Brassac in Auvergne, and from La Fosse, burn with a more agreeable flame, &c. But Mr Morand, in his *Nomenclature Raisonnée*, distributes all sorts of pit-coals into four classes: In the first he places nine varieties, beginning with the *gagas* or *succinum nigrum*, to the variegated lithanthrax; in the second he reckons seven varieties, beginning with the *lithanthrax eleganti strudura*, to that *facie granulata*: and he forms the fourth class with the earthy and poorer kinds of fossil coals. He seems, however, to have been puzzled with the slaty coals, as he ranges them in a separate class, perhaps to shelter himself from the critical objections of those numerous superficial naturalists, who only look for the apparent configuration, without almost any regard to the component parts of fossils.

The coal-trade is of infinite importance to Great Britain, which never could have arrived at its present commercial eminence without it; and this eminence it will be impossible to retain if coal should ever become scarce. This we trust is not likely to be the case, though Mr Williams expresses great fears for it, and informs us that at Newcastle and in many parts of Scotland the mines near the sea are already wasted, the first consequence of which must be an enormous rise in the price. See his observations on this subject in his *Natural History of the Mineral Kingdom*, p. 156, &c. This author says, that coal was not discovered till between the middle of the 12th and beginning of the 13th centuries: it is therefore, according to him, 400 years since it was first

discovered in Britain, but they have not been in common use for more than 200 years. The same author gives us many pertinent observations on the appearances and indications of coal, instructions about searching for it, remarks on false and doubtful symptoms of coal; for all which, together with his observations on the different kinds of Scots coal, we shall refer our readers to the work itself; the first part of which, occupying the largest proportion of the first volume, is upon the *strata of coal*, and on the *concomitant strata*. See also our article COALERY.

PITAHAYA (*Cactus Pitajaya*, Lin. *Syst. Vegetabilium*. Jacquin *Amer.* 151. ed. 2. p. 75. M. *E. Carthagena*), a shrub peculiar to California, is a kind of beech, the fruit of which forms the greatest harvest of the natives. Its branches are finely fluted, and rise vertically from the stem, so as to form a very beautiful top. The fruit is like a horse-chestnut. In some white, in others yellow, and in others red, but always exquisitely delicious, being a rich sweet, tempered with a grateful acid. See CACTUS.

PITCAIRNE (Dr Archibald), a most eminent physician and ingenious poet, was descended from the ancient family of the Pitcairnes of Pitcairne in Fife-shire, and was born at Edinburgh on the 25th of December 1652. He commenced his studies at the school of Dalkeith; and from thence he was removed to the university of Edinburgh, where he improved himself in classical learning, and completed a regular course of philosophy. His friends, according to the authors of the *Biographia Britannica*, were desirous that he should follow the profession of theology. The unpleasant gloom, however, which at that time hung over religion and its professors in Scotland, could not but very ill suit with that native cheerfulness of temper and liberality of mind which made him, long after, a mark for the arrows of preciseness and grimace. The law seems to have been his own choice, and to this science he turned his attention. With an ardour peculiar to himself, and an ambition to excel in whatever he undertook, he pursued it with so much intenseness, that his health began to be impaired. On this account, his physicians advised him to set out for the south of France. By the time he reached Paris, he was happily so far recovered, that he determined to renew his studies; but being informed that there was no able professor of law in that city, and finding several gentlemen of his acquaintance engaged in the study of physic, he went with them to the lectures and hospitals, and employed himself in this manner for several months till his affairs called him home.

On his return, he applied himself chiefly to the mathematics. It is not usual to see the briars of this science and the flowers of poetry growing in the same soil. Here, however, they were happily united; and to this union perhaps was owing that singular command of judgment, over one of the liveliest of fancies, which appears in every part of his works. His intimacy with Dr David Gregory, the celebrated mathematical professor, began about the same time; and probably conduced to cherish his natural aptitude for this study. It was then, in a great measure, new to him; it soon became his principal delight; his progress in it was rapid, and correspondent to his progress in other pursuits. His improvements on the method of infinite series then adopted, which Dr Wallis of Oxford afterwards

Pitahaya,
Pitcairne.

Pitcairne. wards published, were a conspicuous and early proof of his abilities in this science.

Had Dr Pitcairne continued to prosecute the study of the law, and could he have moulded his principles to the times, the first offices and honours of the state might have been looked for without presumption as the probable reward of such talents as he possessed. Struck, however, with the charms of mathematical truth which had been lately introduced into the philosophy of medicine, and hoping to reduce the healing art to geometrical method, he unalterably determined on this less aspiring profession. At the period when he formed this resolution, the ideas of the medical world, already sufficiently confused, were still farther jumbled by the discovery of the circulation of the blood, which had as yet produced nothing but doubt, uncertainty, and astonishment. In Edinburgh at that time there was no school, no hospital, no opportunity of improvement but the chamber and the shop. He therefore soon after returned to Paris. Genius and industry are unhappily not often united in the same character: of such an union, however, Dr Pitcairne is a celebrated instance. During his residence in France, he cultivated the object of his pursuit with his natural enthusiasm, and with a steadiness from which he could not be diverted by the allurements of that joy which, in his hours of social and festive intercourse, he always felt and always gave. Among his various occupations, the study of the ancient physicians seems to have had a principal share. This appears from a treatise which he published some time after his return; and it shows, that he wisely determined to know the progress of medicine from its earliest periods, before he attempted to reform and improve that science.

On the 13th of August 1680, he received, from the faculty of Rheims the degree of Doctor; which, on the 7th of August 1699, was likewise conferred on him by the university of Aberdeen; both being attended with marks of peculiar distinction. Other medical honours are said to have been conferred on him in France and elsewhere; but nothing affords a more unequivocal testimony to his abilities than that which the surgeons of Edinburgh gave, in admitting him, freely and unsolicited, a member of their college. None had such opportunities of judging of his merit as a practitioner, and on no physician did they ever bestow the same public mark of respect. Soon after his graduation at Rheims, he returned to Edinburgh; where, on the 29th of November 1681, the Royal College of Physicians was instituted; and his name, among others, graced the original patent from the crown.

In his *Solutio Problematis de Inventoribus*, the treatise above alluded to, he discovers a wonderful degree of medical literature, and makes use of it in a manner that does great honour both to his head and his heart. His object is to vindicate Dr Harvey's claim to the discovery of the circulation of the blood. The discovery was, at first, controverted by envy, and reprobated by ignorance. When at length its truth

was fully established, many invidiously attempted to tear the laurels from the illustrious Englishman, and to plant them on the brows of Hippocrates and others. Had the attempt been directed against himself, the generous soul of Pitcairne could not have exerted more zeal in a defence; and his arguments remain unanswered.

During his residence in Scotland, his reputation became so considerable, that, in the year 1691, the university of Leyden solicited him to fill the medical chair, at that time vacant. Such an honourable testimony of respect, from a foreign nation, and from such an university, cannot perhaps be produced in the medical biography of Great Britain. The lustre of such characters reflects honour on their profession, and on the country which has the good fortune of giving them birth; and serves to give the individuals of that country not only a useful estimation in their own eyes, but in those also of the rest of the world. Dr Pitcairne's well-known political principles excluded him from public honours and promotion at home: he therefore accepted the invitation from abroad; and, on the 26th of April 1692, delivered, at Leyden, his elegant and masterly inaugural oration: *Oratio qua ostenditur medicinam ab omni philosophorum secta esse liberam*. In this he clears medicine from the rubbish of the old philosophy; separates it from the influence of the different sects; places it on the broad and only sure foundation of experience; shows how little good inquiries into the manner how medicines operate have done to the art; and demonstrates the necessity of a sedulous attention to their effects, and to the various appearances of disease.

Nothing (says an elegant panegyrist* of our author) *Dr Charles Webster, in the Harveian Oration at Edinburgh for the year 1781; from which performance the present article is chiefly extracted. marks a superiority of intellect so much as the courage requisite to stem a torrent of obstinately prevailing and groundless opinions. For this the genius and talents of Pitcairne were admirably adapted; and, in his oration, he displays them to the utmost. It was received with the highest commendations; and the administrators, to testify their sense of such an acquisition to their university, greatly augmented the ordinary appointment of his chair.

He discharged the duties of his office at Leyden so as to answer the most sanguine expectations. He taught with a perspicuity and eloquence which met with universal applause. Independently of the encomiums of Boerhaave and Mead, who were his pupils, the numerous manuscript copies of his lectures, and the mutilated specimen of them† which found its way into the world without his knowledge, show how justly it was bestowed. At the same time, he was not more celebrated as a professor than as a practical physician; and notwithstanding the multiplicity of his business in both these characters, he found leisure to publish several treatises on the circulation, and some other of the most important parts of the animal economy (A).

At the close of the session he set out for Scotland, with an intention of returning in time for the succeeding one. On his marrying (B) the daughter of Sir Archibald

(A) Dr Boerhaave gives the following character of these and some other of Dr Pitcairne's dissertations, which were collected and published at Rotterdam, anno 1701: "Hæc scripta optima sunt et perfecta, five legas Dissertationem de Motu Sanguinis per Pulmones, five alia opuscula, five ultimum tractatum de Opio." *Methodus studii, ab Hallero edita*, p. 569.

(B) He had been married before to a daughter of Colonel James Hay of Pitfour, by whom he had a son and daughter, who both died young.

Pitcairne. Archibald Stevenson, the object of his journey, her relations would on no account consent to part with him again. He was therefore reluctantly obliged to remain; and he wrote the university a polite apology, which was received with the utmost regret. He even declined the most flattering solicitations and tempting offers to settle in London. Indeed he soon came into that extensive practice to which his abilities intitled him, and was also appointed titular professor of medicine in the university of Edinburgh.

The uniformity of a professional life is seldom interrupted by incidents worthy of record. Specimens, however, of that brilliant wit with which he delighted his friends in the hours of his leisure, continue to entertain us (c); and the effects of that eminent skill which he exerted in the cure of disease, still operate to the good of posterity.

The discovery of the circulation, while in some measure it exploded the chemical and Galenical doctrines, tended to introduce mathematical and mechanical reasoning in their stead. Of this theory (d) Dr Pitcairne was the principal support, and the first who introduced it into Britain. A mathematical turn of mind, and a wish for mathematical certainty in medicine, biassed him in its favour, and he pushed it to its utmost extent. One is at a loss whether most to admire or regret such a waste of talents in propping a

theory which, though subversive of former ones, was to fall before others but a little more satisfactory than itself. Mechanical physicians expected more from geometry than that science could grant. They made it the foundation instead of an auxiliary to their inquiries, and applied it to parts of nature not admitting mathematical calculations. By paying more attention afterwards to the supreme influence of the living principle, the source of all the motions and functions of the body, it was found that these could not be explained by any laws of chemistry or mechanism. They are still, however, involved in obscurity; and notwithstanding the numberless improvements which have taken place in the sciences connected with medicine, will perhaps remain inscrutable while man continues in his present stage of existence.

In a science so slowly progressive as that of medicine, Dr Pitcairne did a great deal. By labouring in vain for truth in one road, he saved many the same drudgery, and thereby showed the necessity of another. He not only exploded many false notions of the chemists and Galenists which prevailed in his time, but many of those too of his own sect. In particular, he showed the absurdity of referring all diseases and their cures to an alkali or an acid (e). He refuted the idea of secretion being performed by pores differently shaped (f), Bellini's opinion of effervescences in the

(c) Vide *Pitcairni Poemata*.—Several of his poems, however, are obscure, and some of them totally unintelligible without a key. In those of them which are of a political kind, he wished not to express himself too clearly; and in others, he alludes to private occurrences which were not known beyond the circle of his companions. His poem (*Ad Lindseyum*), addressed to his friend Lindsey, is commented on by the authors of the *Biographia Britannica*; and it is to be regretted that it is the only one on which they have been solicitous to throw light. "Some parts (say they) of this poem, are hardly intelligible, without knowing a circumstance in the Doctor's life, which he often told, and never without some emotion. It is a well known story of the two Platonic philosophers, who promised one another, that whichever died first should make a visit to his surviving companion. This story being read by Mr Lindsey and our author together, they, being both then very young, entered into the same engagement. Soon after, Pitcairne, at his father's house in Fife, dreamed one morning that Lindsey, who was then at Paris, came to him, and told him he was not dead, as was commonly reported, but still alive, and lived in a very agreeable place, to which he could not yet carry him. By the course of the post news came of Lindsey's death, which happened very suddenly the morning of the dream. When this is known, the poem is easily understood, and shines with no common degree of beauty.

"Lyndesi! Stygias jamdudum veste per undas,

"Stagnaue Cocyti non adeunda mihi;

"Excute paulisper Lethæi vincula somni,

"Ut feriant animum carmina nostra tuum.

"Te nobis, te redde tuis, promissa daturus

"Gaudia; sed proavo sis comitante redux:

"Namque novos viros mutataque regna videbis,

"Passaque Teutonicas sceptrâ Britanna manus*.

"He then proceeds to exclaim against the principles and practices which produced this Teutonic violence upon the British sceptre; and concludes with a wish, that Lindsey might bring Rhadamanthus with him to punish them.

"Unus abest scelerum vindex Rhadamanthus; amice,

"Dii faciant reditus sit comes ille tui!

"Every one sees how much keener an edge is given to the satire upon the revolution, by making it an additional reason for his friend's keeping his promise to return him a visit after his death."

(d) See the article *PHYSIOLOGY*, n° 7—14.

(e) *Pitcairni Dissertationes*, Edin. edit. 1713. De opera quam præstant corpora acida vel alkalica in curatione morborum.

(f) De circulatione sanguinis per vasa minima.

* Written
in 1689.

Pitcairne. the animal spirits with the blood, and Borelli's of air entering the blood by respiration (G). He proved the continuity of the arteries and veins (H); and seems to have been the first who showed that the blood flows from a smaller capacity into a larger; that the aorta, with respect to the arterial system, is the apex of a cone (I). In this therefore he may be considered as the latent spring of the discoveries respecting the powers moving the blood. He introduced a simplicity of prescription unknown in pharmacy before his time (K); and such was the state of medicine in this country, that scarcely have the works of any cotemporary or preceding author been thought worthy even of preservation (L). As to the errors of his philosophy, let it be remembered, that no theory has as yet stood the test of many years in an enlightened period. His own hung very loosely about him (M); and the present generally received practice differs from his very little in reality. He treated inflammatory and hemorrhagic diseases by bleeding, purging, and blistering, as has been done uniformly and solely on the different theories since. His method of administering mercury and the bark is observed at this day; and with respect to febrile, nervous, glandular, and dropical affections, they seem to be as often the opprobriums of the art now as they were then.

Dr Pitcairne was universally considered as the first physician of his time. No one appears ever to have had so much practice in this country, or so many consultations from abroad; and no one, from all accounts, ever practised with greater sagacity and success. The highest thought themselves honoured by his acquaintance, and the lowest were never denied his assistance and advice. The emoluments of his profession must have been great; but his charities are known to have been correspondent. The possession of money he postponed to more liberal objects: he collected one of the finest private libraries in the world; which was purchased, after his death, by the Czar of Muscovy. Notwithstanding the fatigues he underwent in the exercise of his profession, his constitution was naturally delicate. About the beginning of October 1713, he became affected with his last illness; and on the 23d he died, regretted by science as its ornament, by his country as its boast, and by humanity as its friend. He left a son and four daughters: of whom only one of the latter now survives. The present noble family of Kelly are his grandchildren.

Some anonymous publications are attributed to Dr Pitcairne, particularly a treatise *De Legibus Historie Naturalis*, &c.; but the only ones he thought proper to legitimate are his *Dissertationes Medicæ*, and a short essay *De Salute*.

PITCAITHLY. See PITKEATHLY.

PITCH, a tenacious oily substance, drawn chiefly from pines and firs, and used in shipping, medicine, and various arts: or it is more properly tar inspissated by boiling it over a slow fire. See TAR.

Fossil PITCH. See PETROLEUM.

PITCHING, in sea-affairs, may be defined the vertical vibration which the length of a ship makes about her centre of gravity; or the movement by which she plunges her head and after-part alternately into the hollow of the sea. This motion may proceed from two causes: the waves which agitate the vessel; and the wind upon the sails, which makes her stoop to every blast thereof. The first absolutely depends upon the agitation of the sea, and is not susceptible of inquiry; and the second is occasioned by the inclination of the masts, and may be submitted to certain established maxims.

When the wind acts upon the sails, the mast yields to its effort, with an inclination which increases in proportion to the length of the mast, to the augmentation of the wind, and to the comparative weight and distribution of the ship's lading.

The repulsion of the water, to the effort of gravity, opposes itself to this inclination, or at least sustains it, by as much as the repulsion exceeds the momentum, or absolute effort of the mast, upon which the wind operates. At the end of each blast, when the wind suspends its action, this repulsion lifts the vessel; and these successive inclinations and repulsions produce the movement of pitching, which is very inconvenient; and, when it is considerable, will greatly retard the course, as well as endanger the mast, and strain the vessel.

PITH, in vegetation, the soft spongy substance contained in the central parts of plants and trees *.

* See Plant.

PITHO, (fab. hist.) the goddess of persuasion among the Romans. She was supposed to be the daughter of Mercury and Venus, and was represented with a diadem on her head, to intimate her influence over the hearts of man. One of her arms appeared raised as in the attitude of an orator haranguing in a public assembly; and with the other she holds a thunderbolt and fetters, made with flowers, to signify the powers of reasoning and the attractions of eloquence. A caduceus, as a symbol of persuasion, appears at her feet, with the writings of Demosthenes and Cicero, the two most celebrated among the ancients, who understood how to command the attention of their audience, and to rouse and animate their various passions.—A Roman courtesan. She received this name on account of the allurements which her charms possessed, and of her winning expressions.

PITHOM,

(G) De diversa mole qua sanguis fluit per pulmones.

(H) De circulatione sanguinis per vasa minima.

(I) De circulatione sanguinis in animalibus genitis et non genitis.

(K) *Elementa Medicinæ*, lib. i. cap. 21. et passim.

(L) The first medical publication which distinguished this country, after Dr Pitcairne's, was that of the *Edinburgh Medical Essays*, in the year 1732. Vid. the article MONRO.

(M) Patet (says he) medicinam esse memoriam eorum quæ cuilibet morbo usus ostendit fuisse utilia. Nam notas non esse corporum intra venas fluentium aut consistentium naturas, adeoque sola observatione innotescere quid cuique morbo conveniat, postquam sæpius eadem eidem morbo profuisse comperimus. *De Div. Morb.*

Pithom.
Pithou.

PITHOM, one of the cities that the children of Israel built for Pharaoh in Egypt (Exod. i. 11.) during the time of their servitude. This is probably the same city with Pathumoa mentioned by Herodotus, which he places upon the canal made by the kings Necho and Darius to join the Red sea with the Nile, and by that means with the Mediterranean. We find also in the ancient geographers, that there was an arm of the Nile called *Pathmeticus*, *Phatmicus*, *Phatnicus*, or *Phatniticus*. Bochart says, that Pithom and Raames are about five leagues above the division of the Nile, and beyond this river: but this assertion has no proof from antiquity. This author contents himself with relating what was said of Egypt in his own time. Marsham will have Pithom to be the same as Pelusium or Damietta.

PITHOU or **PITHOEUS** (Peter), a Frenchman of great literary eminence, was descended from an ancient and noble family in Normandy, and born at Troyes in 1539. His taste for literature appeared very early, and his father cultivated it to the utmost. He first studied at Troyes, and was afterwards sent to Paris, where he became first the scholar, and then the friend, of Turnebus. Having finished his pursuits in languages and the belles lettres, he was removed to Bourges, and placed under Cujacius in order to study civil law. His father was well skilled in this profession, and has left no inconsiderable specimen of his judgment in the advice he gave his son with regard to acquiring a knowledge of it; which was, not to spend his time and pains upon voluminous and barren commentators, but to confine his reading chiefly to original writers. He made so rapid a progress, that at seventeen he was able to speak extempore upon the most difficult questions; and his master was not ashamed to own, that even himself had learned some things of him. Cujacius afterwards removed to Valence; and Pithœus followed him, and continued to profit by his lectures till the year 1560. He then returned to Paris, and frequented the bar of the parliament there, in order to join practical forms and usages to his theoretic knowledge.

In 1563, being then 24, he published *Adversaria Subseciva*, a work highly applauded by Turnebus, Lipsius, and other learned men; and which laid the foundation of that great and extensive fame he afterwards acquired. Soon after this, Henry III. advanced him to some considerable posts; in which, as well as at the bar, he acquitted himself most honourably. Pithœus being a Protestant, it was next to a miracle that he was not involved in the terrible massacre of St Bartholomew in 1572; for he was at Paris where it was committed, and in the same lodgings with several Huguenots, who were all killed. It seems indeed to have frightened him out of his religion; which having, according to the custom of converts, examined and found to be erroneous, he soon abjured, and openly embraced the Catholic faith. He afterwards attended the duke of Montmorency into England; and on his return, from his great wisdom, good nature, and amiable manners, he became a kind of oracle to his countrymen, and even to foreigners, who consulted him on all important occasions: an instance of which we have in Ferdinand the Grand Duke of Tuscany, who not only consulted him, but even submitted to his determination in a point contrary to his interests. Hen-

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ry III. and IV. were greatly obliged to him for combating the League in the most intrepid manner, and for many other services, in which he had recourse to his pen as well as to other means.

Pithœus died upon his birth-day in 1596, leaving behind him a wife whom he had married in 1579, and some children. Thuanus says he was the most excellent and accomplished man of the age in which he lived; and all the learned have agreed to speak well of him. He collected a very valuable library, containing a variety of rare manuscripts, as well as printed books; and he took many precautions to hinder its being dispersed after his death, but in vain. He published a great number of works upon law, history, and classical literature; and he gave several new and correct editions of ancient writers. He was the first who made the world acquainted with the Fables of Phædrus: which, together with the name of their author, were utterly unknown and unheard of, till published from a manuscript of his.

PITISCUS (Samuel), a learned antiquary, born at Zutphen, was rector of the college of that city, and afterwards of St Jerome at Utrecht, where he died on the first of February 1717, aged 90. He wrote, 1. *Lexicon Antiquitatum Romanorum*, in two volumes folio; a work which is esteemed. 2. Editions of many Latin authors, with notes; and other works.

PITKEATHLY, or **PITCAITHLY**, is the name of an estate in Strathern in Scotland, famous for a mineral spring. An intelligent traveller * gives the following account of it. "The situation of the mineral spring at Pitcaithly, the efficacy with which its waters are said to operate in the cure of the diseases for which they are used, and the accommodations which the neighbourhood affords, are all of a nature to invite equally the sick and the healthy. Two or three houses are kept in the style of hotels for the reception of strangers. There is no long-room at the well; but there are pleasing walks through the adjoining fields. Good roads afford easy access to all the circumjacent country. This delightful tract of Lower Strathern is filled with houses and gardens, and stations from which wide and delightful prospects may be enjoyed; all of which offer agreeable points to which the company at the well may direct their forenoon excursions; conversation, music, dances, whist, and that best friend to elegant, lively, and social converse, the tea-table, are sufficient to prevent the afternoons from becoming languid: and in the evenings nothing can be so delightful as a walk when the setting sun sheds a soft slanting light, and the dew has just not begun to moisten the grass.—Thus is Pitcaithly truly a rural watering-place. The company cannot be at any one time more in number than two or three families. The amusements of the place are simply such as a single family might enjoy in an agreeable situation in the country; only the society is more diversified by the continual change and fluctuation of the company." See *MINERAL Waters*, p. 55.

PITOT (Henry), of a noble family in Languedoc, was born at Aramont in the diocese of Uzes, on the 29th of May 1695, and died there on the 27th of December 1771, aged 76. He learned the mathematics without a master, and went to Paris in 1718, where he formed a close friendship with the illustrious

5 G

Reaumur.

Pitiscus
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Pitot.

*Heron's
Journey
through the
Western
Counties of
Scotland.

Pitot,
Pits.

Reaumur. In 1724, he was admitted a member of the Royal Academy of Sciences at Paris, and in a few years rose to the degree of a pensioner. Besides a vast number of Memoirs printed in the collection of that society, he published in 1731 the Theory of the Working of Ships, in one volume 4to; a work of considerable merit, which was translated into English, and made the author be admitted into the Royal Society of London. In 1740, the states-general of Languedoc made choice of him for their chief engineer, and gave him at the same time the appointment of inspector general of the canal which unites the two seas. That province is indebted to him for several monuments of his genius, which will transmit his name with lustre to posterity. The city of Montpellier being in want of water, Pitot brought from the distance of three leagues two springs which furnish a plentiful supply of that necessary article. They are brought to the magnificent Place du Peyron, and thence are distributed through the city. This astonishing work is the admiration of all strangers. The illustrious marshal de Saxe was the great patron and friend of Pitot, who had taught this hero the mathematics. In 1754 he was honoured with the order of St Michael. In 1735 he had married Maria-Leonina Pharambier de Sabballoua, descended of a very ancient noble family of Navarre. By this marriage he had only one son, who was first advocate-general of the Court of Accounts, Aids, and Finances of Montpellier. Pitot was a practical philosopher, and a man of uncommon probity and candour. He was also a member of the Royal Society of Sciences of Montpellier; and his eulogium was pronounced in 1772 by M. de Ratte perpetual secretary, in presence of the states of Languedoc; as it likewise was at the Royal Academy of Sciences of Paris by Abbé de Fouchi, who was then secretary.

PITS (John), the biographer, was born in 1560, at Aulton in Hampshire, and educated at Wykeham's school, near Winchester, till he was about 18 years of age; when he was sent to New-college in Oxford, and admitted probationer fellow. Having continued in that university not quite two years, he left the kingdom as a voluntary Romish exile, and retired to Douay; thence he went to the English college at Rheims, where he remained about a year; and then proceeded to Rome, where he continued a member of the English college near seven years, and was made a priest. In 1589 he returned to Rheims; and there, during two years, taught rhetoric and the Greek language. He now quitted Rheims on account of the civil war in France; and retired to Pont à Mousson in Lorraine, where he took the degrees of master of arts and bachelor in divinity. Hence he travelled into Germany, and resided a year and a half at Triers, where he commenced licentiate in his faculty. From Triers he visited several of the principal cities in Germany; and continuing three years at Ingoldstadt in Bavaria, took the degree of doctor in divinity. Thence having made the tour of Italy, he returned once more to Lorraine; where he was patronised by the cardinal of that duchy, who preferred him to a canonry of Verdun; and about two years after he became confessor to the duchess of Cleves, daughter to the duke of Lorraine. During the leisure he enjoyed in this employment, he wrote in Latin the lives of the kings,

bishops, apostolical men, and writers of England. The last of these, commonly known and quoted by this title, *De illustribus Angliæ scriptoribus*, was published after his death. The three first remain still in manuscript among the archives of the collegiate church of Liverdun. The duke of Cleves dying after Pits had been about twelve years confessor to the duchess, she returned to Lorraine, attended by our author, who was promoted to the deanery of Liverdun, which, with a canonry and officialship, he enjoyed to the end of his life. He died in 1616, and was buried in the collegiate church. Pits was undoubtedly a scholar, and not an inelegant writer; but he is justly accused of ingratitude to Bale, from whom he borrowed his materials, without acknowledgment. He quotes Leland with great familiarity, without ever having seen his book: his errors are innumerable, and his partiality to the Romish writers most obvious; nevertheless we are obliged to him for his account of several popish authors, who lived abroad at the beginning of the Reformation.

PITT (Christopher), an eminent English poet, celebrated for his excellent translation of Virgil's *Æneid*, was born in the year 1699. Having studied four years at New-college, Oxford, he was presented to the living of Pimperne in Dorsetshire, which he held during the remainder of his life. He had so poetical a turn, that while he was a school-boy he wrote two large folios of manuscript poems, one of which contained an entire translation of Lucan. He was much esteemed while at the university; particularly by the celebrated Dr Young, who used familiarly to call him his *son*. Next to his fine translation of Virgil, Mr Pitt gained the greatest reputation by his excellent English translation of Vida's art of poetry. This amiable poet died in the year 1648, without leaving, it is said, one enemy behind him.

PITT (William) earl of Chatham, a most celebrated British statesman and patriot, was born in November 1708. He was the youngest son of Robert Pitt, Esq; of Boconnock in Cornwall; and grandson of Thomas Pitt, Esq; governor of Fort St George in the East Indies, in the reign of queen Anne, who sold an extraordinary fine diamond to the king of France for 135,000 l. and thus obtained the name of *Diamond Pitt*. His intellectual faculties and powers of elocution very soon made a distinguished appearance; but at the age of 16 he felt the attacks of an hereditary and incurable gout, by which he was tormented at times during the rest of his life.

His lordship entered early into the army, and served in a regiment of dragoons. Through the interest of the duchess of Marlborough he obtained a seat in parliament before he was 21 years of age. His first appearance in the house was as representative of the borough of Old Sarum, in the ninth parliament of Great Britain. In the 10th he represented Seaford, Aldborough in the 11th, and the city of Bath in the 12th; where he continued till he was called up to the house of peers in 1766. The intention of the duchess in bringing him thus early into parliament was to oppose Sir Robert Walpole, whom he kept in awe by the force of his eloquence. At her death, the duchess left him 10,000 l. on condition, as was then reported, that he never should receive a place in administration.

Pitt.

However, if any such condition was made, it certainly was not kept on his Lordship's part. In 1746 he was appointed vice-treasurer of Ireland, and soon after paymaster general of the forces, and sworn a privy-counsellor. He discharged the office of paymaster with such honour and inflexible integrity, refusing even many of the perquisites of his office, that his bitterest enemies could lay nothing to his charge, and he soon became the darling of the people. In 1755 he resigned the office of paymaster, on seeing Mr Fox preferred to him. The people were alarmed at this resignation; and being disgusted with the unsuccessful beginning of the war, complained so loudly, that, on the 4th December 1756, Mr Pitt was appointed secretary of state in the room of Mr Fox afterwards Lord Holland; and other promotions were made in order to second his plans. He then took such measures as were necessary for the honour and interest of the nation; but in the month of February 1757, having refused to assent to the carrying on a war in Germany for the sake of his majesty's dominions on the continent, he was deprived of the seals on the 5th of April following. Upon this the complaints of the people again became so violent, that on the 29th of June he was again appointed secretary, and his friends filled other important offices. The success with which the war was now conducted is universally known; yet on the 5th of October 1761, Mr Pitt, to the astonishment of almost the whole kingdom, resigned the seals into his majesty's own hands. The reason of this was, that Mr Pitt, having received certain intelligence that the family-compact was signed between France and Spain, and that the latter was about to join France against us, thought it necessary to prevent her by commencing hostilities first. Having communicated this opinion in the privy-council, the other ministers urged that they would think twice before they declared war against that kingdom. "I will not give them leave to think (replied Mr Pitt); this is the time, let us crush the whole house of Bourbon. But if the members of this board are of a different opinion, this is the last time I shall ever mix in its councils. I was called into the ministry by the voice of the people, and to them I hold myself answerable for my conduct. I am to thank the ministers of the late king for their support; I have served my country with success; but I will not be responsible for the conduct of the war any longer than while I have the direction of it." To this bold declaration, the lord who then presided in council made the following reply. "I find the gentleman is determined to leave us; nor can I say that I am sorry for it, since he would otherwise have certainly compelled us to leave him. But if he is resolved to assume the right of advising his majesty, and directing the operations of the war, to what purpose are we called to this council? When he talks of being responsible to the people, he talks the language of the house of commons, and forgets that at this board he is responsible only to the king. However, though he may possibly have convinced himself of his infallibility, still it remains that we should be equally convinced before we can resign our understandings to his direction, or join with him in the measure he proposes."

This conversation, which was followed by Mr Pitt's resignation, is sufficient to show the haughtiness and

imperious temper of our minister. However, these very qualities were sometimes productive of great and good consequences, as appears from the following anecdote.

—Preparatory to one of the secret expeditions during the war which ended in 1763 the minister had given orders to the different presiding officers in the military, navy, and ordnance departments, to prepare a large body of forces, a certain number of ships, and a proportionable quantity of stores, &c. and to have them all ready against a certain day. To these orders he received an answer from each of the officers, declaring the total impossibility of a compliance with them. Notwithstanding it was then at a very late hour, he sent immediately for his secretary; and after expressing his resentment at the ignorance or negligence of his majesty's servants, he gave the following commands:—"I desire, Mr Wood, that you will immediately go to Lord Anson; you need not trouble yourself to search the admiralty, he is not to be found there; you must pursue him to the gaming house, and tell him from me, that if he does not obey the orders of government which he has received at my hands, that I will most assuredly impeach him. Proceed from him to Lord Ligonier; and though he should be bolstered with harlots, undraw his curtains, and repeat the same message. Then direct your course to Sir Charles Frederick, and assure him, that if his majesty's orders are not obeyed, they shall be the last which he shall receive from me." In consequence of these commands, Mr Wood proceeded to White's, and told his errand to the first lord of the admiralty; who insisted that the secretary of state was out of his senses, and it was impossible to comply with his wishes: "however, (added he), as madmen must be answered, tell him that I will do my utmost to satisfy him." From thence he went to the commander in chief of the forces, and delivered the same message. He also said that it was an impossible business; "and the secretary knows it, (added the old lord): nevertheless, he is in the right to make us do what we can; and what is possible to do, inform him, shall be done." The surveyor general of the ordnance was next informed of Mr Pitt's resolution; and, after some little consideration, he began to think that the orders might be completed within the time prescribed. The consequence at last was, that every thing, in spite of impossibilities themselves, was ready at the time appointed.

After his resignation in 1761, Mr Pitt never had any share in administration. He received a pension of 3000 l. a year, to be continued after his decease, during the survivancy of his lady and son; and this gratuity was dignified with the title of *Baroness of Chatham* to his lady, and that of *Baron* to her heirs-male. Mr Pitt at that time declined a title of nobility; but in 1766 accepted of a peerage under the title of *Baron Pynsent and Earl of Chatham*, and at the same time he was appointed lord privy-seal.

This acceptance of a peerage proved very prejudicial to his lordship's character. However, he continued steadfast in his opposition to the measures of administration. His last appearance in the House of Lords was on the 2d of April 1778. He was then very ill and much debilitated: but the question was important, being a motion of the duke of Richmond to address his majesty to remove the ministers, and make peace with America on any terms. His lord-

Pitt.

Pitt.

ship made a long speech, which had certainly overcome his spirits: for, attempting to rise a second time, he fell down in a convulsive fit; and though he recovered for that time, his disorder continued to increase till the 11th of May, when he died at his seat at Hayes. His death was lamented as a national loss. As soon as the news reached the House of Commons, which was then sitting, Colonel Barré made a motion, that an address should be presented to his majesty, requesting that the Earl of Chatham should be buried at the public expence. But Mr Rigby having proposed the erecting of a statue to his memory, as more likely to perpetuate the sense of his great merits entertained by the public, this was unanimously carried. A bill was soon after passed, by which 4000l. a-year was settled upon John, now earl of Chatham, and the heirs of the late earl to whom that title may descend.—His lordship was married in 1754 to Lady Hester, sister to the earl of Temple; by whom he had three sons and two daughters.

Never perhaps was any life so multifarious as that of Lord Chatham; never did any comprise such a number of interesting situations. To bring the scattered features of such a character into one point of view, is an arduous task. The author of the history of his life * has attempted to do it; and with the outlines of what he has said in summing up his character, we shall finish our biographical sketch of this wonderful man.

* History of
the Life of
William
Pitt, Earl
of Chatham.

“ One of the first things that strikes us, in the recollection of Chatham’s life, is the superior figure he makes among his contemporaries. Men of genius and attraction, a Carteret, a Townshend, and I had almost said a Mansfield, however pleasing in a limited view, appear evidently in this comparison to shrink into narrower dimensions, and walk a humbler circle. All that deserves to arrest the attention, in taking a general survey of the age in which he lived, is comprised in the history of Chatham. No character ever bore the more undisputed stamp of originality. Unresembled and himself, he was not born to accommodate to the genius of his age. While all around him were depressed by the uniformity of fashion, or the contagion of venality, he stood aloof. He consulted no judgment but his own; and he acted from the untainted dictates of a comprehensive soul.

“ The native royalty of his mind is eminently conspicuous. He felt himself born to command; and the free sons of Britain implicitly obeyed him. In him was realised the fable of Orpheus; and his genius, his spirit, his eloquence, led millions in his train, subdued the rugged savage, and disarmed the fangs of malignity and envy. Nothing is in its nature so inconsistent as the breath of popular applause: and yet that breath was eminently his during the greater part of his life. Want of success could not divert it; inconsistency of conduct could not change its tenor. The astonishing extent of his views, and the mysterious comprehension of his plans, did not in one respect set him above little things: nothing that was necessary to the execution of his designs was beneath him. In another respect, however, he was infinitely estranged to little things: swallowed up in the business of his country, he did not think of the derangement of his own private affairs; for, though indisposed to all the modes of dissipated expence, his affairs, even when his circumstances were

much improved, were always deranged. But the features that seem most eminently to have characterised him, were spirit and intrepidity: they are conspicuous in every action and in every turn of his life; nor did this spirit and intrepidity leave him even at the last.

“ The manners of lord Chatham were easy and bland, his conversation was spirited and gay, and he readily adapted himself to the complexion of those with whom he associated. That artificial reserve, which is the never-failing refuge of self-diffidence and cowardice, was not made for him. He was unconstrained as artless infancy, and generous as the noon-day sun: yet had he something impenetrable that hung about him. By an irresistible energy of soul, he was haughty and imperious. He was incapable of associating councils, and he was not formed for the sweetest bands of society. He was a pleasing companion, but an unpliant friend.

“ The ambition of our hero, however generous in its strain, was the source of repeated errors in his conduct. To the resignation of lord Carteret, and again, from the commencement of the year 1770, his proceedings were bold and uniform. In the intermediate period they were marked with a versatility, incident only in general to the most flexible minds. We may occasionally trace in them the indecision of a candidate, and the suppleness of a courtier. In a word, he aimed at the impossible task of flattering at once the prejudices of a monarch, and pursuing unremittedly the interests of the people.

“ A feature, too, sufficiently prominent in his character, was vanity, or perhaps pride and conscious superiority. He dealt surely somewhat too freely with invective. He did not pretend to an ignorance of his talents, or to manage the display of his important services. Himself was too often the hero of his tale; and the successes of the last war the burden of his song. † Ending in

“ Patriotism was also the source of some of his imperfections. He loved his country too well; or, if that may sound absurd, the benevolence at least, that embraces the species, had not sufficient scope in his mind. He once styled himself a lover of honourable war; and in so doing he let us into one trait of his character. The friend of human kind will be an enemy to all war. He indulged too much a puerile antipathy to the house of Bourbon: and it was surely the want of expansive affections that led him to so unqualified a condemnation of American independency.

“ But the eloquence of lord Chatham was one of his most striking characteristics. He far outstripped his competitors, and stood alone the rival of antiquity.

“ His eloquence was of every kind. No man excelled him in close argument and methodical deduction: but this was not the style into which he naturally fell. His oratory was unlaboured and spontaneous: he rushed at once upon the subject; and usually illustrated it rather by glowing language and original conception, than by cool reasoning. His person was tall and dignified; his face was the face of an eagle; his piercing eye withered the nerves, and looked through the souls of his opponents; his countenance was stern, and the voice of thunder sat upon his lips: anon, however, he could descend to the easy and the playful. His voice seemed scarcely more adapted to energy and to terror, than

Pittacus. than it did to the melodious, the insinuating, and the sportive. If, however, in the enthusiasm of admiration, we can find room for the frigidity of criticism, his action seemed the most open to objection. It was forcible, uniform, and ungraceful. In a word, the most celebrated orators of antiquity were in a great measure the children of labour and cultivation. Lord Chatham was always natural and himself."

To the misfortune of the republic of letters, and of posterity, his lordship never sought the press. Lord Chesterfield says, "that he had a most happy turn for poetry: but it is more than probable that Chesterfield was deceived; for we are told by his biographer that his verses to *Gerrick* were very meagre, and Lord Chatham himself said that he seldom indulged and seldom avowed it. It should seem, then, that he himself set no great value upon it. Perhaps a proper confidence of one's self is essential to all extraordinary merit. Why should we ambitiously ascribe to one mind every species of human excellence? But though he was no poet, it is more than probable, that he would have excelled as much in writing prose as he did in speaking it.

PITTACUS, a native of Mitylene in Lesbos, was one of the seven wise men of Greece: his father's name was Hyrradius. With the assistance of the sons of Alcæus, he delivered his country from the oppression of the tyrant Melanchrus; and in the war which the Athenians waged against Lesbos, he appeared at the head of his countrymen, and challenged to single combat Phrynon the enemy's general. As the event of the war seemed to depend upon this combat, Pittacus had recourse to artifice; and when he engaged, he entangled his adversary in a net which he had concealed under his shield, and easily dispatched him. He was amply rewarded for this victory; and his countrymen, sensible of his merit, unanimously appointed him governor of their city with unlimited authority. In this capacity Pittacus behaved with great moderation and prudence; and after he had governed his fellow-citizens with the strictest justice, and after he had established and enforced the most salutary laws, he voluntarily resigned the sovereign power after having enjoyed it for 10 years, observing that the virtues and innocence of private life were incompatible with the power and influence of a sovereign. His disinterestedness gained him many admirers; and when the Mityleneans wished to reward his public services by presenting him with an immense tract of territory, he refused to accept more land than what should be contained in the distance to which he could throw a javelin. He died in the 70th year of his age, about 579 years before Christ, after he had spent the last 10 years of his life in literary ease and peaceful retirement.

The following maxims and precepts are ascribed to Pittacus: The first office of prudence is to foresee threatening misfortunes, and prevent them. Power discovers the man. Never talk of your schemes before they are executed; lest, if you fail to accomplish them, you be exposed to the double mortification of disappointment and ridicule. Whatever you do, do it well. Do not that to your neighbour which you would take ill from him. Be watchful for opportunities.

Many of his maxims were inscribed on the walls of Apollo's temple at Delphi, to show to the world how

great an opinion the Mityleneans entertained of his abilities as a philosopher, a moralist, and a man. By one of his laws, every fault committed by a man when intoxicated deserved double punishment.

PITTENWEEM, a small town situated on the Frith of Forth, towards the eastern extremity of the county of Fife in North Britain. It takes its name from a small cave in the middle of it anciently called a *weem*, and is remarkable for nothing but the ruins of a religious house, which is sometimes called an *abbey* and sometimes a *priory*. Which of these is the proper denomination it is hardly worth while to inquire; but it appears from the arms of the monastery, still preserved over the principal gate, that the superior, by whatever title he was called, had the privilege of wearing a mitre. This edifice, which seems never to have been large, was, with other monuments of mistaken piety, alienated from the church at the Reformation; and what parts of it now remain are put to very different uses. Some of the cells of the monks furnish habitations tolerably convenient for the servants of him who, in the ceaseless change of property, has got possession of the lands which formerly belonged to them. That which seems to have been the granary is a decent parish church. The porch of the chapel, the only part of that building which exists, has been alternately employed as a stable and a slaughter-house; and the meat killed there has been commonly exposed to sale in the lower part of the steeple of that edifice which is now dedicated to the offices of parochial devotion. Had the moralizing traveller*, who composed the beautiful and pathetic meditation on the ruins of *Iona*, condescended to visit Pittenweem, he would not have viewed the abbey without emotion. Insignificant as the place at present is, it seems to have been of some consequence in the last century; and we are led to infer, from the following extract from the records, that the inhabitants were opulent, and that the town was fortified.

"Pittenweem, decimo-quarto Feb. 1651. The bailies and council being convened, and having received information that his majesty is to be in progress with his court along the coast to-morrow, and to stay at Anstruther house that night, have thought it expedient, according to their bounden duty, with all reverence and due respect, and with all the same solemnity they can, to wait upon his majesty, as he comes through this his majesty's burgh, and invite his majesty to eat and drink as he passes; and for that effect hath ordained, that the morn afternoon the town's colours be put upon the bertisene of the steeple, and that at three o'clock the bells begin to ring, and ring on still till his majesty comes hither, and passes to Anstruther: And sicklike, that the minister be spoken to, to be with the bailies and council, who are to be in their best apparel, and with them a guard of 24 of the ablest men, with partizans, and other 24 with muskets, all in their best apparel, William Sutherland commanding as captain of the guard; and to wait upon his majesty, and to receive his highness at the West Port, bringing his majesty and court through the town, until they come to Robert Smith's yeet, where an table is to be covered with my Lord's* best carpet: and that George Hetherwick have in readiness, of fine flour, some great buns, and other wheat-bread of the best order, baked with

Pittenweem.

* Johnson.

* The Earl of Kelly.

Pitt-sporum
||
Pityocampasis.

with sugar, cannell, and other spices fitting; and that James Richardson and Walter Airth have care to have ready eight or ten gallons of good strong ale, with Canary, sack, Rhenish wine, tent, white and claret wines, that his majesty and his court may eat and drink; and that in the mean time, when his majesty is present, the guard do diligently attend about the court; and so soon as his majesty is to go away, that a sign be made to Andrew Tod, who is appointed to attend the colours on the steeple head, to the effect he may give sign to those who attend the cannon of his majesty's departure, and then the *baill thirty-six cannons to be all shot at once*. It is also thought fitting, that the minister, and James Richardson the oldest bailie, when his majesty comes to the table, show the great joy and sense this burgh has of his majesty's condescendence to visit the same, with some other expressions of loyalty. All which was acted." N. Lat. 56. 11. W. Long. 2. 49.

PITTOSPORUM, in botany; a genus of the monogynia order, belonging to the pentandria class of plants. The calyx is pentaphyllous, inferus and deciduous. The petals are five in number; the style thread shaped; the capsule somewhat angular, trilocular, and contain three or four angulated seeds, adhering to the capsule by means of a liquid resin in the locuments. Of this there are three species, viz. 1. *Tenuifolium*. 2. *Umbellatum*. 3. *Coriaceum*. The first and second are natives of the Cape of Good Hope; the third grows in Madeira, and flowers in May and June.

PITUITARY GLAND. See ANATOMY, p. 758.

PITYOCAMPASIS, in entomology, the caterpillar of the pine-tree, received its compound name from that substance. It was considered as a poison, and as a remedy, according to its different employment; but our chief information is derived from M. Reaumur, who has attentively observed its manner of life. The animal cannot bear much cold, and is therefore never found in the higher latitudes. It is styled processionary, because it never leaves its hold, where many families reside, till the evening, when it feeds in trains, led on by two or three, and this train leaves a ribband of silk in its way for those behind follow exactly the steps of those which preceded, and each leaves its fibre of silk. Their nests are found in autumn; they are born the middle of September, become torpid in December, and recover their strength again in spring. They then descend from the trees, plunge into the earth, and undergo their last change. It is the bombyx pityocampa of Fabricius, (*Mantissa Insector. tom. ii. p. 114. n° 66.*), and greatly resembled the processionary caterpillar of the oak. The ancients used it as a vesicatory, and the acrimony seems to reside chiefly in a dust which is concealed in receptacles on its back. This is its offensive weapon, for it is thrown out at will, and produces very troublesome effects, though the hair of the animal and every part of its body seem to have a similar, but weaker power. The effect is also weaker in winter; but this may depend on the diminished irritability of the human body, as well as on the torpid state of the insect. Their silk is not sufficiently strong for the loom, and in hot water melts almost to a paste. In the earth it forms nests of stronger silk, but it is then found with difficulty: in boxes its silk is extremely tender. Adding to all these inconveniencies, handling the cones produces all the bad effects of the dust. Matthiæus recommends them

as a styptic, and perhaps they may serve for burning on the skin instead of moxa, the downy silk of a species of artemisia. The ancients, afraid of its hurtful qualities, used them with caution, and enacted laws against their being sold promiscuously: the modern planter is chiefly afraid of them because they destroy the beauty of his trees, and he endeavours to collect the eggs by cutting off the branches, which are burnt immediately.

PIVAT, or **PIVOT**, a foot or shoe of iron or other metal, usually conical or terminating in a point, whereby a body, intended to turn round, bears on another fixed at rest, and performs its revolutions. The pivot usually bears or turns round in a sole, or piece of iron or brass hollowed to receive it.

PIUS II. (*Æneas-Sylvius Piccolomini*), was born on the 18th of October 1405, at Corsigni in Siennese, the name of which he afterwards changed into that of *Pienza*. His mother Victoria Forteguerria, when she was with child of him, dreamed that she should be delivered of a mitred infant; and as the way of degrading clergymen at that time was by crowning them with a paper mitre, she believed that Æneas would be a disgrace to his family. But what to her had the appearance of being a disgrace, was a presage of the greatest honours. Æneas was carefully educated, and made considerable proficiency in the belles lettres. After having finished his studies at Sienna, he went in 1431 to the council of Bale with Cardinal Capranica, surnamed *De Fermo*, because he was entrusted with the government of that church. Æneas was his secretary, and was then only 26 years of age. He afterwards acted in the same capacity to some other prelates, and to Cardinal Albergati. The council of Bale honoured him with different commissions, in order to recompense him for the zeal with which he defended that assembly against Pope Eugene IV. He was afterwards secretary to Frederic III. who decreed to him the poetic crown, and sent him ambassador to Rome, Milan, Naples, Bohemia, and other places. Nicolas V. advanced him to the bishopric of Trieste, which he quitted some time after for that of Sienna. At last, after having distinguished himself in various nunciatures, he was invested with the Roman purple by Calixtus III. whom he succeeded two years after on the 27th of August 1458. Pius II. now advanced to the holy see, made good the proverb, *Honores mutant mores*. From the commencement of his pontificate, he appeared jealous of the papal prerogatives. In 1460 he issued a bull, "declaring appeals from the pope to a council to be null, erroneous, detestable, and contrary to the sacred canons." That bull, however, did not prevent the procurator-general of the parliament of Paris from appealing to a council in defence of the Pragmatic sanction, which the pope had strenuously opposed. Pius was then at Mantua, whither he had gone in order to engage the Catholic princes to unite in a war against the Turks. The greater part of them agreed to furnish either troops or money; others refused both, particularly the French, who from that moment incurred his holiness's aversion. That aversion abated under Louis XI. whom he persuaded in 1461 to abolish the Pragmatic sanction, which the parliament of Paris had supported with so much vigour.

The following year, 1462, was rendered famous by

Pivat,
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Pius.

a controversy which took place between the Cordeliers and Dominicans, whether or not the blood of Jesus Christ was separated from his body while he lay in the grave. It was also made a question whether it was separated from his divinity. The Cordeliers affirmed that it was, but the Dominicans were of an opposite opinion. They called each other heretics; which obliged the pope to issue a bull, forbidding them under pain of censure to brand one another with such odious epithets. The bull which his holiness published on the 26th of April, retracting what he had written to the council of Bale when he was its secretary, did not redound much to his honour. "I am a man (says he), and as a man I have erred. I am far from denying that a great many things which I have said and written may deserve condemnation. Like Paul, I have preached through deception, and I have persecuted the church of God through ignorance. I imitate the blessed Augustin, who having suffered some erroneous sentiments to creep into his works, retracted them. I do the same thing; I frankly acknowledge my ignorances, from a fear lest what I have written in my younger years should be the occasion of any error that might afterwards be prejudicial to the interests of the holy see. For if it be proper for any one to defend and support the eminence and glory of the first throne of the church, it is in a peculiar manner my duty, whom God, out of his mercy and goodness alone, without any merit on my part, has raised to the dignity of *vicar of Jesus Christ*. For all these reasons, we exhort and admonish you in the Lord, not to give credit to those writings of ours which tend in any degree to hurt the authority of the apostolic see, and which establish opinions that are not received by the Roman church. If you find, then, any thing contrary to her doctrine either in our dialogues, in our letters, or in any other of our works, despise these opinions, reject them, and adopt our present sentiments. Believe me rather now that I am an old man, than when I addressed you in my earlier days. Esteem a sovereign pontiff more than a private person; except against *Aeneas Sylvius*, but receive Pius II." It might be objected to his holiness, that it was his dignity alone which had made him alter his opinion. He anticipates that objection, by giving a short account of his life and actions, with the whole history of the council of Bale, to which he went with Cardinal Capranica in 1431; "but (says he) I was then a young man, and without any experience, like a bird just come from its nest." In the mean time, the Turks were threatening Christendom. Pius, ever zealous in the defence of religion against the infidels, forms the resolution of fitting out a fleet at the expence of the church, and of passing over into Asia himself, in order to animate the Christian princes by his example. He repaired to Ancona with a design to embark; but he there fell sick with the fatigue of the journey, and died on the 16th of August 1464, aged 59 years. Pius was one of the most learned men of his time, and one of the most zealous pontiffs; but being of an ambitious and pliant disposition, he sometimes sacrificed to that ambition. His principal works are, 1. Memoirs of the council of Bale, from the suspension of Eugenius to the election of Felix. 2. The history of the Bohemians,

from their origin to the year 1458. 3. Two books on cosmography. 4. The history of Frederic III. whose vice-chancellor he had been. This performance was published in 1785 in folio, and is believed to be pretty accurate and very particular. 5. A treatise on the education of children. 6. A poem upon the passion of Jesus Christ. 7. A collection of 432 letters, printed at Milan, 1473, in folio, in which are found some curious anecdotes. 8. The memoirs of his own life, published by John Gobelin Personne his secretary, and printed at Rome in 4to in 1584. There is no doubt of this being the genuine production of that pontiff. 9. *Historia rerum ubicumque gestarum*, of which only the first part was published at Venice in 1477 in folio. His works were printed at Helmstadt in 1700, in folio, at the beginning of which we find his life. That verse of Virgil's *Aeneid* (lib. i. v. 382.) which begins thus,

Sum pius Aeneas, ———

and the end of the following verse,

————— *fama super aethera notus,*

have been applied to him.

Pius IV. (John Angel Cardinal de Medicis), of a different family from that of Florence, was born at Milan in 1499. He was son to Bernardin Medechini, and brother of the famous Marquis de Marignan, Charles Vth's general. He raised himself by his own merit, and filled several important offices under Popes Clement VII. and Paul III. Julius III. who had entrusted him with several legations, honoured him with a cardinal's hat in 1549. After the death of Paul IV. he was advanced to St Peter's chair on the 25th of December 1559. His predecessor had rendered himself detestable to the Romans, who treated his memory with every mark of indignity, and Pius IV. commenced his pontificate by pardoning them. He did not, however, extend the same clemency to the nephews of Pope Paul IV.; for he caused Cardinal Caraffe to be strangled in the castle of St Angel, and his brother, the Prince de Palliano, to be beheaded. His zeal was afterwards directed against the Turks and heretics. In order to stop, if possible, the progress of these last, he renewed the Council of Trent, which had been suspended. He knew well (says Abbé de Choisy), that that council might make some regulations which would have the effect to lessen his authority; but on the other hand, he perceived that great inconveniences might result from its not being assembled; and "*in the main* (said he to his confidants) *it is better to feel evil for once than to be always in dread of it.*" In 1561 he dispatched nuncios to all the Catholic and Protestant princes, to present them with the bull for calling that important assembly. An end was, however, put to it by the industry of his nephew, S. Charles Borromeus, in 1563; and, on the 26th of January the year following, he issued a bull for confirming its decrees. In 1565 a conspiracy was formed against his life by Benedict Acolti, and some other visionaries. Those madmen had taken it into their head that Pius IV. was not a lawful Pope, and that after his death they would place another in St Peter's chair, with the title of *Pope Angelicus*, under whom errors might be reformed, and peace restored to the church. The conspiracy was discovered, and the fanatic Benedict put to death. This pontiff died a little

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Pius.

the time after, on the 9th of December 1565, aged 66 years, carrying to the grave with him the hatred of the Romans, whom his severities had exasperated. He was a man of great address, and very fruitful in his resources. He adorned Rome with several public edifices; but these ornaments tended greatly to impoverish it. If he was the instrument of raising his relations in the world, it must be allowed, at least, that the greater part of them did him honour.

PIUS V. (S. Michael Ghisleri), born at Boschi or Bosco, in the diocese of Fortona, on the 17th of January 1504; was, according to Abbé de Choisy, son to a senator of Milan. He turned a Dominican friar. Paul IV. informed of his merit and virtue, gave him the bishopric of Sutri, created him cardinal in 1557, and made him inquisitor-general of the faith among the Milanese and in Lombardy; but the severity with which he exercised his office obliged him to quit that country. He was sent to Venice, where the ardour of his zeal met with still greater obstacles. Pius IV. added to the cardinal's hat the bishopric of Mondovi. After the death of that pontiff, he was advanced to St Peter's chair in 1566. The Romans expressed but little joy at his coronation: he was very sensible of it, and said, "*I hope they will be as sorry at my death as they are at my election*;" but he was mistaken. Raised by his merit to the first ecclesiastical preferment in Christendom, he could not divest himself of the severity of his character; and the situation in which he found himself rendered, perhaps, that severity necessary. One of his first objects was to repress the luxury of the clergy, the pride of the cardinals, and the licentious manners of the Romans. He caused the decrees of reformation enacted by the Council of Trent to be put in execution; he prohibited bull-baiting in the Circus; he expelled from Rome the women of the town; and allowed the cardinals to be prosecuted for their debts. The errors which overflowed the Christian world gave him great uneasiness. After having employed gentle and lenient measures in the reclaiming of heretics, he had recourse to severity, and some of them ended their days in the flames of the inquisition. He particularly displayed his zeal for the grandeur of the Holy See in 1568, by ordaining that the bull *In cana domini*, which was published at Rome every year on *Maunday-Thursday*, and which Clement XIV. suppressed, should be published likewise throughout the whole church. That bull, the work of several sovereign pontiffs, principally regards the jurisdiction of the ecclesiastical and civil power. It anathematizes those who appeal from the decrees of popes to a general council; those who favour the appellants; the universities which teach that the pope is subject to a general council; the princes who would restrain the ecclesiastical jurisdiction, or who exact contributions from the clergy. It was rejected by all the sovereign states, excepting a very few. In 1580, some bishops having endeavoured to introduce it into their dioceses, the parliament caused their temporalities to be seized upon, and declared those guilty of high treason who should imitate the fanaticism of those prelates. Pius V. for some time meditated an expedition against the Turks. He had the courage to make war on the Ottoman empire, by forming a league with the Venetians and Philip II. king of Spain. This was the first time that the standard of the two keys was seen displayed against the

crescent. The naval armies came to an engagement, on the 7th of October 1571, in Lepanto Bay, in which the confederate Christian princes obtained a signal victory over the Turks, who lost above 30,000 men, and near 200 galleys. This success was principally owing to the Pope, who exhausted both his purse and person in fitting out that armament. He died of the gravel six months after, on the 30th of April 1572, aged 68. He repeated often, in the midst of his sufferings, "*O Lord! increase my pains and my patience*." His name will for ever adorn the list of Roman pontiffs. It is true that his bull against queen Elisabeth, and his other bull in favour of the inquisition, with his rigorous prosecution of heretics both in France and Ireland, prove that he had more zeal than sweetness in his temper; but in other respects he possessed the virtues of a saint and the qualities of a king. He was the model of the famous Sixtus Quintus, to whom he gave an example of amassing in a few years such savings as were sufficient to make the Holy See be regarded as a formidable power. Sultan Selim, who had no greater enemy than this pope, caused public rejoicings to be made at Constantinople for his death during the space of three days. The pontificate of Pius is also celebrated for the condemnation of Baius, the extinction of the order of Humilies, and the reformation of that of the Cistercians. He was canonized by Clement XI. in 1712. There are extant several of his letters, printed at Anvers in 1640, in 4to. Felibien, in 1672, published his *Life*, translated from the Italian of Agatio di Somma; but we cannot vouch for the fidelity of the translation.

PIX. See *MINT-Marks*.

PIZARRO (Francis), a celebrated Spanish general, the discoverer and conqueror of Peru, in conjunction with Diego Almagro, a Spanish navigator. They are both charged with horrid cruelties to the inhabitants; and they fell victims to their own ambition, jealousy, and avarice. Almagro revolting, was defeated and beheaded by Pizarro, who was assassinated by Almagro's friends in 1541. See *PERU*.

PLACE, LOCUS, in philosophy, a mode of space, or that part of immovable space which any body possesses. See *METAPHYSICS*, n° 185.

PLACE, in astronomy. The place of the sun, a star, &c. denotes the sign and degree of the zodiac which the luminary is in; or the degree of the ecliptic, reckoning from the beginning of aries, which the planet or star's circle of longitude cuts; and therefore coincides with the longitude of the sun, planet, or star. As the sine of the sun's greatest declination $23^{\circ} 30'$: to the sine of any present declination given or observed, for instance, $23^{\circ} 15'$: so is the radius 10: to the sine of his longitude $81^{\circ} 52'$; which, if the declination were north, would give $20^{\circ} 52'$ of gemini; if south, $20^{\circ} 52'$ of capricorn, for the sun's place. See *DECLINATION*, &c.

The place of the moon being that part of her orbit wherein she is found at any time, is of various kinds, by reason of the great inequalities of the lunar motions, which render a number of equations and reductions necessary before the just point be found. The moon's fictitious place is her place once equated; her place nearly true, is her place twice equated; and her true place thrice equated. See *ASTRONOMY*, *passim*.

PLACES, in war, a general name for all kinds of fortresses

Place
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Placentia.

treffes where a party may defend themselves. Thus,
1. A strong or fortified place is one flanked, and covered with bastions. 2. A regular place, one whose angles, sides, bastions, and other parts, are equal; and this is usually denominated from the number of its angles, as a pentagon, hexagon, &c. 3. Irregular place is one whose sides and angles are unequal.—
4. Place of arms is a strong city or town pitched upon for the chief magazine of an army; or, in a city or garrison, it is a large open spot of ground, usually near the centre of the place where the grand guard is commonly kept, and the garrison holds its rendezvous at reviews, and in cases of alarm to receive orders from the governor. 5. Places of arms of an attack, in a siege, is a spacious place covered from the enemy by a parapet or epaulement, where the soldiers are posted ready to sustain those at work in the trenches against the soldiers of the garrison. 6. Place of arms particular, in a garrison, a place near every bastion, where the soldiers sent from the grand place to the quarters assigned them relieve those that are either upon the guard or in fight. 7. Place of arms without, is a place allowed to the covert way for the planting of cannon, to oblige those who advance in their approaches to retire. 8. Place of arms in a camp, a large place at the head of the camp for the army to be ranged in and drawn up in battalia. There is also a place for each particular body, troop, or company, to assemble in.

Common-PLACE. See COMMON-Place.

PLACENTA, in anatomy and midwifery, a soft roundish mass, found in the womb of pregnant women; which, from its resemblance to the liver, was called by the ancients *hepar uterinum*, uterine liver.

PLACENTIA, called by the natives *Piacenza*, is a town of Italy, and capital of a duchy of the same name, with a bishop's see. It is seated about 100 paces from the river Po, in a very fertile pleasant plain, watered by a great number of rivulets, and surrounded with hills, abounding in all sorts of fruits. In its territory there are salt springs, from which they make a very white salt; and there are also mines of iron, woods, and warrens. It contains a great number of merchants, and is reckoned three miles in circumference. Its fortifications are inconsiderable, but the citadel is pretty strong. The streets are straight, and the principal street, called *Stradone*, is 25 common paces broad and 3000 feet long, in a direct line, with 600 stone posts, for separating the foot from the carriage-way, and on both sides are 11 spacious convents. The other buildings of the city are not very remarkable, though it contains 45 churches, 28 convents, and two almshouses. The cathedral is pretty much in the Gothic taste; but the church of the Augustines is reckoned the most beautiful, and esteemed worthy of its architect, the celebrated Vignoli. The ducal palace, though large, makes no great appearance on the outside; but within are some good apartments. In the area before the town-house stands two admirable brass statues of Alexander and Renatus IV. both of the house of Farnese, and dukes of Parma and Placentia. The bishop is suffragan to the archbishop of Milan. At this city begins the *Via Æmilia*, which extends as far as Rimini on the Adriatic. The number of the inhabitants is about 30,000, among whom there are 2000

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ecclesiastics. This city has been taken several times in the wars of Italy. The king of Sardinia took possession of it in 1744, it being ceded to him by the queen of Hungary; but it was taken from him in 1746, after a bloody battle. It has a famous university, and the inhabitants are much esteemed for their politeness. There is a great fair here every year on the 15th of April, which is much frequented. It is about 32 miles north-west of Parma and 83 east of Turin. E. Long. 10. 24. N. Lat. 45. 5.

PLAGIARY, in philology, the purloining another man's works, and putting them off as our own. Among the Romans, *plagiarius* was properly a person who bought, sold, or retained a freeman for a slave; and was so called, because, by the Flavian law, such persons were condemned *ad plagas*, "to be whipped."

Thomasius has an express treatise *De plagio literario*; wherein he lays down the laws and measures of the right which authors have to one another's writings.—
"Dictionary-writers, at least such as meddle with *arts and sciences* (as is pertinently observed by Mr Chambers), seem exempted from the common laws of *meum and tuum*; they do not pretend to set up on their own bottom, nor to treat you at their own cost. Their works are supposed, in great measure, compositions of other peoples; and what they take from others, they do it avowedly, and in the open sun.—In effect, their quality gives them a title to every thing that may be for their purpose, wherever they find it; and if they rob, they do not do it any otherwise than as the bee does, for the public service. Their occupation is not pillaging, but collecting contributions; and if you ask them their authority, they will produce you the practice of their predecessors of all ages and nations."

PLAGIUM, in law. See KIDNAPPING.

PLAGUE, PESTILENCE, or *Pestilential Fever*, is a very acute, malignant, and contagious disease; being a putrid fever of the worst kind, and seldom failing to prove mortal. Though it is generally defined a malignant fever, Diemerbroeck thinks they ought to be distinguished, since the fever is not the essence of the disease, but merely a symptom or effect of it. See MEDICINE, n° 221.

The plague, as is generally agreed, is never bred or propagated in Britain, but always imported from abroad, especially from the Levant, Lesser Asia, Egypt, &c. where it is very common. Sydenham has remarked that it rarely infects this country oftener than once in 40 years, and happily we have been free of it for a much longer period.

Authors are not as yet agreed concerning the nature of this dreadful distemper. Some think that insects are the cause of it, in the same way that they are the cause of blights, being brought in swarms from other climates by the wind, when they are taken into the lungs in respiration; the consequence of which is, that they mix with the blood and juices, and attack and corrode the viscera. Mr Boyle, on the other hand, thinks it originates from the effluvia or exhalations breathed into the atmosphere from noxious minerals, to which may be added stagnant waters and putrid bodies of every kind.

Mr Gibbon thinks that the plague is derived from damp, hot, and stagnating air, and the putrefaction

Plagiary
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Plague.

Plague.

of animal substances, especially locusts. See *Gibbon's Roman History*, 4to edit. vol. iv. p. 327—332, where there is also a very particular account of the plague which depopulated the earth in the time of the Emperor Justinian.

The Mahometans believe that the plague proceeds from certain spirits, or goblins, armed with bows and arrows, sent by God to punish men for their sins; and that when the wounds are given by spectres of a black colour, they certainly prove fatal, but not so when the arrows are shot by those that appear white. They therefore take no precaution to guard themselves against it. The wiser professors of this religion, however, at present act otherwise; for we find a receipt recommended by Sidy Mohammed Zerroke, one of the most celebrated Marabout's, prefaced with these remarkable words: "The lives of us all are in the hands of God, when it is we must die. However, it hath pleased him to save many persons from the plague, by taking every morning while the infection rages one pill or two of the following composition; viz. of myrrh two parts, saffron one part, of aloes two parts, of syrup of myrtle-berries, q. s. But this remedy is confined to the more enlightened; for the bigotry of the lower sort is so extreme as to make them despise all precautions which people of other nations use. Of this extreme and foolish prejudice Dr Chandler gives an interesting account when speaking of the plague at Smyrna. This learned author is of opinion that the disease arises from animalcules, which he supposes to be invisible. See *Chandler's Travels in Asia Minor*, p. 279, &c.

It is a remarkable fact, that plagues are sometimes partial, and that they only attack particular animals, or a particular description of persons, avoiding others altogether, or attacking them but slightly. Thus Fernelius informs us of a plague, or murrain, in 1514, which invaded only cats. Dionysius Halicarnassensis mentions a plague which attacked none but maids; and that which raged in the time of Gentilis, killed scarce any women, and very few but lusty men. Boterus mentions another plague, which assaulted none but the younger sort; and we have instances of the same kind of a later standing (A). Cardan speaks of a plague at Basil, with which the Switzers were infected, and the Italians, Germans, or French, exempted: and John Utenhovius takes notice of a dreadful one at Copenhagen, which, tho' it raged among the Danes, spared the Germans, Dutch, and English, who went with all freedom, and without the least danger, to the houses of the infected. During the plague which ravaged Syria in 1760, it was observed that people of the soundest constitutions were the most liable to it, and that the weak and delicate were either spared or easily cured. It was most fatal to the Moors; and when it attacked them it was generally incurable.

When the plague raged in Holland in 1636, a young girl was seized with it, had three carbuncles, and was removed to a garden, where her lover, who was betrothed to her, attended her as a nurse, and slept with her as his wife. He remained uninfected, and she recovered, and was married to him. The story is related

by Vinc. Fabricius in the *Misc. Cur. Ann. II. Obs.* 188.

Many methods have been adopted in different countries to prevent the importation of this dreadful scourge of the human race, and to stop the progress of infection after it has been imported. In England, mayors, bailiffs, head officers of corporations, and justices of peace, have power to tax inhabitants, houses, and lands, &c. within their precincts, for the relief of persons infected with the plague; and justices of the county may tax persons within five miles round, on a parish's inability; the tax to be levied by distress and sale of goods, or in default thereof by imprisonment. Infected persons going abroad, after being commanded to keep house for avoiding farther infection, may be resisted by watchmen, &c. and punished as vagrants, if they have no sores upon them; and if they have infectious sores on them it is felony. Justices of peace, &c. are to appoint searchers, examiners, and buriers of the dead, in places infected, and administer oaths to them for the performance of their duties, &c. *stat. 1 Jac. 1. cap. 31.* See QUARANTINE.

The commission at Moscow having, in the year 1770, invented a fumigation-powder, which, from several lesser experiments, had proved efficacious in preventing the infection of the plague; in order more fully to ascertain its virtue in that respect, it was determined, towards the end of the year, that ten malefactors under sentence of death should, without undergoing any other precautions than the fumigations, be confined three weeks in a lazaretto, be laid upon the beds, and dressed in the clothes, which had been used by persons sick, dying, and even dead, of the plague in the hospital. The experiment was accordingly tried, and none of the ten malefactors were then infected, or have been since ill. The fumigation-powder is prepared as follows.

Powder of the first strength.] Take leaves of juniper, juniper-berries pounded, ears of wheat, guaiacum-wood pounded, of each six pounds; common saltpetre pounded, eight pounds; sulphur pounded, six pounds; Smyrna tar, or myrrh, two pounds; mix all the above ingredients together, which will produce a pood of the powder of fumigation of the first strength. [V. B. A pood is 40 pounds Russian, which are equal to 35 pounds and a half or 36 pounds English avoirdupoise.]

Powder of the second strength.] Take southernwood cut into small pieces, four pounds; juniper-berries pounded, three pounds; common saltpetre pounded, four pounds; sulphur pounded, two pounds and a half; Smyrna tar, or myrrh, one pound and a half; mix the above together, which will produce half a pood of the powder of fumigation of the second strength.

Odoriferous powder.] Take the root called *kalmus* cut into small pieces, three pounds; leaves of juniper cut into small pieces, four pounds; frankincense pounded grossly, one pound; storax pounded, and rose-flowers, half a pound; yellow amber pounded, one pound; common saltpetre pounded, one pound and a half; sulphur, a quarter of a pound: mix all the above

(A) See the account of the yellow fever under the article PHILADELPHIA, where we find that that disease was less fatal to some sorts of persons than to others.

Plague. above together, which will produce nine pounds and three quarters of the odoriferous powder.

Remark on the powder of fumigation.] If guaiacum cannot be had, the cones of pines or firs may be used in its stead; likewise the common tar of pines and firs may be used instead of the Smyrna tar, or myrrh, and mugwort may supply the place of southernwood.

Thucydides, who was himself infected, lib. ii. gives us an account of a dreadful plague which happened at Athens about the year before Christ 430, while the Peloponnesians under the command of Archidamus wasted all her territory abroad; but of these two enemies the plague was by far the most dreadful and severe.

The most dreadful plague that ever raged at Rome was in the reign of Titus, A. D. 80. The emperor left no remedy unattempted to abate the malignity of the distemper, acting during its continuance like a father to his people. The same fatal disease raged in all the provinces of the Roman empire in the reign of M. Aurelius, A. D. 167, and was followed by a dreadful famine, by earthquakes, inundations, and other calamities. The Romans believed that Æsculapius sometimes entered into a serpent, and cured the plague.

About the year 430 the plague visited Britain, just after the Picts and Scots had made a formidable invasion of the southern part of the island. The plague raged with uncommon fury, and swept away most of those whom the sword and famine had spared, so that the living were scarce sufficient to bury the dead.

About the year 1348 the plague became almost general over Europe. A great many authors give an account of this plague, which is said to have appeared first in the kingdom of Kathay in the year 1346, and to have proceeded gradually westward to Constantinople and Egypt. From Constantinople it passed into Greece, Italy, France, and Africa, and by degrees along the coasts of the ocean into Britain and Ireland, and afterwards into Germany, Hungary, Poland, Denmark, and the other northern kingdoms. According to Antoninus archbishop of Florence the distemper carried off 60,000 people in that city, among whom was the historian John Villani.

In the year 1656 the plague was brought from Sardinia to Naples, being introduced into the city by a transport with soldiers on board. It raged with excessive violence, carrying off in less than six months 400,000 of the inhabitants. The distemper was at first called by the physicians a malignant fever; but one of them affirming it to be pestilential, the viceroy, who was apprehensive lest such a report would occasion all communication with Naples to be broke off, was offended with this declaration, and ordered him to be imprisoned. As a favour, however, he allowed him to return and die in his own house. By this proceeding of the viceroy, the distemper being neglected, made a most rapid and furious progress, and filled the whole city with consternation. The streets were crowded with confused processions, which served to spread the infection through all the quarters. The terror of the people increased their superstition; and it being reported that a certain nun had prophesied that the pestilence would cease upon building a hermitage for her sister nuns upon the hill of St Martin's, the edifice was immediately begun with the most ardent zeal. Persons of the highest quality strove who should per-

form the meanest offices; some loading themselves with beams, and others carrying baskets full of lime and nails, while persons of all ranks stripped themselves of their most valuable effects, which they threw into empty hogsheds placed in the streets to receive the charitable contributions. Their violent agitation, however, and the increasing heats, diffused the malady through the whole city, and the streets and the stairs of the churches were filled with the dead; the number of whom, for some time of the month of July, amounted daily to 15,000.

The viceroy now used all possible precautions to abate the fury of the distemper, and to prevent its spreading to the provinces. The infection, however, desolated the whole kingdom, excepting the provinces of Otranto and the Farther Calabria, and the cities of Gaeta, Sorrento, Paolo, and Belvedere. The general calamity was increased in Naples by malecontents, who insinuated that the distemper had been designedly introduced by the Spaniards, and that there were people in disguise who went through the city sowing poisoned dust. This idle rumour enraged the populace, who began to insult the Spanish soldiers, and threaten a sedition; so that the viceroy, to pacify the mob, caused a criminal to be broke upon the wheel, under pretence that he was a disseminator of the dust. A violent and plentiful rain falling about the middle of August, the distemper began to abate; and on the eighth of December the physicians made a solemn declaration that the city was entirely free from infection.

Of the dreadful plague which raged at London in the year 1665, the reader will find an account in the article LONDON, n^o 21. In 1720 the city of Marseilles was visited with this destructive disease, brought in a ship from the Levant; and in seven months, during which time it continued, it carried off not less than 60,000 people. This desolation is not yet obliterated from the minds of the inhabitants; some survivors remained alive but a few years ago to transmit a traditional account of it to after ages. There are two fine pictures painted by Puget representing some of the horrid scenes of that time. "They are (says lady Craven) only too well executed. I saw several dying figures taking leave of their friends, and looking their last anxious, kind, and wishful prayers on their sick infants, that made the tears flow down my cheeks. I was told the physicians and noblemen who were assisting the sick and dying, were all portraits: I can easily conceive it; for in some faces there is a look of reflection and concern which could only be drawn from the life." *Letters*, p. 34, 35. This fatal event has caused the laws of quarantine to be very strictly enforced in the Lazaretto here, which is an extensive insulated building.

The ravages of this disease have been dreadful wherever it has made its appearance. On the first arrival of the Europeans at the island of Gran Canaria, it contained 14,000 fighting men, soon after which, two thirds of the whole inhabitants fell a sacrifice to the plague, which had doubtless been introduced by their new visitors. The destruction it has made in Turkey in Europe, and particularly in Constantinople, must be known to every reader; and its fatal effects have been particularly heightened there by that firm belief which prevails among the people of predestination, &c. as has been already mentioned. It is generally brought

Plain
Plancus.

brought into European Turkey from Egypt; where it is very frequent, especially at *Grand Cairo*. To give even a list of all the plagues which have desolated many flourishing countries, would extend this article beyond all bounds, and minutely to describe them all would be impossible. For the plague at Smyrna, we refer to Chandler's Travels as above. Respecting that which raged in Syria in 1760, we refer to the Abbé Mariti's Travels through Cyprus, Syria, and Palestine, vol. 1st, p. 278—296. This plague was one of the most malignant and fatal that Syria ever experienced; for it scarcely made its appearance in any part of the body when it carried off the patient.

PLAIN, or PLANE, in general, an appellation given to whatever is smooth and even, or simple, obvious, and easy to be understood; and, consequently, stands opposed to rough, enriched, or laboured.

A plain figure, in geometry, is an uniform surface; from every point of whose perimeter right lines may be drawn to every other point in the same.

A plain angle is one contained under two lines, or surfaces, in contradistinction to a solid angle. See ANGLE.

The doctrine of plain triangles, as those included under three right lines, is termed *plain trigonometry*. See the article TRIGONOMETRY.

PLAIN Chart. See the article CHART.

PLAIN-Sailing. See NAVIGATION, p. 685.

PLAISE, the English name of a species of pleuronectes. See PLEURONECTES.

PLAN, in general, denotes the representation of something drawn on a plane; such are maps, charts, ichnographies, &c. See MAP, CHART, &c.

The term *plan*, however, is particularly used for a draught of a building, such as it appears, or is intended to appear, on the ground, showing the extent, division, and distribution of its area or ground-plot into apartments, rooms, passages, &c.

A geometrical plan is that wherein the solid and vacant parts are represented in their natural proportions.

The raised plan of a building is the same with what is otherwise called an *elevation* or *orthography*. See ORTHOGRAPHY.

A perspective plan is that exhibited by degradations or diminutions, according to the rules of perspective. See PERSPECTIVE.

To render plans intelligible, it is usual to distinguish the masses with a black wash; the projectures on the ground are drawn in full lines, and those supposed over them in dotted lines. The augmentations or alterations to be made are distinguished by a colour different from what is already built; and the tints of each plan made lighter as the stories are raised.

In large buildings it is usual to have three several plans for the three first stories,

PLANCUS (Francis), doctor of physic, born at Amiens in 1696, and who died on the 19th of September 1765, aged 69 years, is author of some works which do honour to his memory. 1. A complete System of Surgery, in 2 vols in 12mo; a treatise much recommended by surgeons to their pupils. 2. A choice Library of Medicine, taken from periodical publications, both French and others: this curious collection, con-

tinued and completed by M. Goulin, makes 9 vols in 4to, or 18 vols in 12mo. 3. A Translation of Vander Wiel's Observations on Medicine and Surgery, 1758, 2 vols in 12mo. Plancus was the editor of various editions of works on medicine and surgery, and enriched them with notes. He shut himself up in his study for a long time before he practised his profession.

PLANE, in geometry, denotes a plane surface, or one that lies evenly between its bounding lines: and as a right line is the shortest extension from one point to another, so a plane surface is the shortest extension from one line to another.

In astronomy, conics, &c. the term *plane* is frequently used for an imaginary surface, supposed to cut and pass through solid bodies; and on this foundation is the whole doctrine of conic sections built. See ASTRONOMY, CONIC Sections, &c.

In mechanics planes are either horizontal, that is, parallel to the horizon, or inclined thereto. See MECHANICS.

The determining how far any given plane deviates from an horizontal line, makes the whole business of levelling. See the article LEVELLING.

In optics, the planes of reflection and refraction are those drawn through the incident and reflected or refracted rays. See OPTICS.

In perspective we meet with the perspective plane, which is supposed to be pellucid, and perpendicular to the horizon; the horizontal plane, supposed to pass through the spectator's eye, parallel to the horizon; the geometrical plane, likewise parallel to the horizon, wherein the object to be represented is supposed to be placed, &c. See PERSPECTIVE.

The plane of projection in the stereographic projection of the sphere, is that on which the projection is made, corresponding to the perspective plane. See PROJECTION.

PLANE, in joinery, an edged tool or instrument for parting and shaving of wood smooth.—It consists of a piece of wood very smooth at bottom, as a stock or shaft; in the midst of which is an aperture, through which a steel edge, or chisel, placed obliquely, passes; which, being very sharp, takes off the inequalities of the wood along which it slides.

PLANE-Tree, in botany. See PLATANUS.

PLANET, a celestial body, revolving round the sun as a centre, and continually changing its position with respect to the fixed stars; whence the name *planet*, which is a Greek word, signifying "wanderer."

The planets are usually distinguished into primary and secondary. The primary ones, called by way of eminence *planets*, are those which revolve round the sun as a centre; and the secondary planets, more usually called *satellites* or *moons*, are those which revolve round a primary planet as a centre, and constantly attend it in its revolution round the sun.

The primary planets are again distinguished into superior and inferior. The superior planets are those farther from the sun than our earth; as Mars, Jupiter, Saturn, and the Georgium Sidus; and the inferior planets are those nearer the sun than our earth, as Venus and Mercury. See ASTRONOMY.

That the planets are opaque bodies, like our earth, is thought probable for the following reasons. 1. Since in Venus, Mercury, and Mars, only that part of the disk

Planet
||
Planetary.

disk illuminated by the sun is found to shine; and again, Venus and Mercury, when between the earth and the sun, appear like dark spots or maculae on the sun's disk; it is evident, that Mars, Venus, and Mercury, are opaque bodies, illuminated with the borrowed light of the sun. And the same appears of Jupiter, from its being void of light in that part to which the shadow of the satellites reaches, as well as in that part turned from the sun; and that his satellites are opaque, and reflect the sun's light, is abundantly shown. Again, since Saturn, with his ring and satellites, only yield a faint light, fainter considerably than that of the fixed stars, though these be vastly more remote, and than that of the rest of the planets; it is past doubt that he too with his attendants are opaque bodies. 2. Since the sun's light is not transmitted through Mercury and Venus, when placed against him, it is plain they are dense opaque bodies; which is likewise evident of Jupiter, from his hiding the satellites in his shadow; and therefore, by analogy, the same may be concluded of Saturn. 3. From the variable spots of Venus, Mars, and Jupiter, it is evident these planets have a changeable atmosphere; which changeable atmosphere may, by a like argument, be inferred of the satellites of Jupiter; and therefore, by similitude, the same may be concluded of the other planets. 4. In like manner, from the mountains observed in Venus, the same may be supposed in the other planets. 5. Since, then, Saturn, Jupiter, and the satellites of both, Mars, Venus, and Mercury, are opaque bodies shining with the sun's borrowed light, are furnished with mountains, and encompassed with a changeable atmosphere; they have, of consequence, waters, seas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth. *Q. E. D.* And hence it seems also highly probable, that the other planets have their animal inhabitants as well as our earth.

PLANETARIUM, an astronomical machine, so called from its representing the motions, orbits, &c. of the planets, agreeable to the Copernican system. See **ASTRONOMY**, n° 489. and Plate LXXXVIII.

PLANETARY, something that relates to the planets. Hence we say, planetary worlds, planetary in-

habitants, &c. Huygens and Fontenelle bring several probable arguments for the reality of planetary animals, plants, men, &c. See **PLANET**. Planetary
||
Planisphere.

PLANETARY System, is the system or assemblage of the planets, primary and secondary, moving in their respective orbits, round their common centre the sun. See **ASTRONOMY**.

PLANETARY Days.—Among the ancients, the week was shared among the seven planets, each planet having its day. This we learn from Dion Cassius and Plutarch, *Sympos.* l. 4. q. 7. Herodotus adds, that it was the Egyptians who first discovered what god, that is, what planet, presides over each day; for that among this people the planets were directors. And hence it is, that in most European languages the days of the week are still denominated from the planets; Sunday, Monday, &c. See **WEEK**.

PLANETARY Years, the periods of time in which the several planets make their revolutions round the sun or earth.—As from the proper revolution of the sun, the solar year takes its original; so from the proper revolutions of the rest of the planets about the earth, so many sorts of years do arise, viz. the Saturnian year, which is defined by 29 Egyptian years, 174 hours, 58 minutes, equivalent in a round number to 30 solar years.—The Jovial year, containing 317 days, 14 hours, 59 minutes.—The Martial year, containing 321 days, 23 hours, 31 minutes.—For Venus and Mercury, as their years, when judged of with regard to the earth, are almost equal to the solar year; they are more usually estimated from the sun, the true centre of their motions: in which case, the former is equal to 224 days, 16 hours, 40 minutes; the latter to 87 days, 23 hours, 14 minutes.

PLANIMETRY, that part of geometry which considers lines and plain figures, without considering their height or depth. See **GEOMETRY**.

PLANISPHERE, signifies a projection of the sphere, and its various circles on a plane; in which sense, maps, whereon are exhibited the meridians and other circles of the sphere, are planispheres. See **MAP**.

END OF THE FOURTEENTH VOLUME.

E R R A T A.

- Vol. I. p. 566. col. 2. l. 10. from the bottom. For "Eubœa, now the Black Sea," read "Eubœa, now Negropont."
- Vol. II. p. 374. col. 2. l. 27. For "the old English writers call those large muskets *calivers*, &c." read "the old English writers call the *hand-gun* a *caliver*, and that which was fired with a rest sometimes a *musket* and sometimes a *harquebust*. See *Shakespeare*, 2d part *Henry IV. Steevens*."
- Vol. III. p. 19. article BAROCO. Read
Omnis homo est bipes,
Aliquid animal non est bipes;
Aliquid animal non est homo.
- p. 417. col. 2. For "BOSWORTA," read "BOSWORTH."
l. 21. For "Richard" read "Richmond;" for "Henry III." read "Henry VII."
N. B. These errors in the article BOSWORTH do not run through the whole impression.
- p. 439. col. 1. l. 26. from the bottom. For "*b b, arifla*," read "*a, a, arifla*."
col. 2. l. 1. from the top. Read "*tropæolum*."
- p. 493. col. 1. l. 22. For "manners," read "miners."
col. 2. l. 13. from the bottom. Read "Sir Roger Man-wood chief-baron."
- Vol. IV. p. 342. col. 1. l. 10. from the bottom. Read "Plate CXXVI."
p. 360 col. 2. l. 22. from the bottom. Read "L. 40 a-year."
- Vol. V. p. 57. col. 2. l. 4. For *δρα*, read *υδρα*.
p. 89. col. 2. l. 16. from the bottom. Read "felony without benefit of clergy, by stat. &c."
p. 105. col. 2. l. 16. For "false," read "fefs."
p. 135. col. 2. l. 24. For "Redcliffe," read "Ratcliffe."
p. 496. col. 1. For "ally," read "tally."
p. 509. col. 2. l. 14. For "Cambridge," read "Oxford."
p. 720. col. 2. l. 14. For "goddes," read "god."
- Vol. IX. p. 160. col. 1. l. 9. from the bottom. For "Edward II." read "Richard I."
- Vol. XIII. p. 131. col. 1. l. 13. For "meek," read "mock."
p. 132. col. 1. l. 28. from the bottom. For "call," read "cull."
p. 169. Note (A). Read "the person was sworn &c."
p. 210. col. 1. l. 15. For "spreads," read "spread."
col. 2. l. 27. For "fit," read "fet."
p. 263. col. 1. l. 10. from the bottom. For "inseparable," read "measurable."
col. 2. l. 29. For "shining," read "thinning."
p. 287. and p. 288. to be cancelled.
p. 289. col. 1. To Cor. 6. add, "This proposition is true in lenses and mirrors, but not in single refracting surfaces."
p. 521. last line. For "Prommetichus," read "Pfammetchus."
p. 682. col. 1. l. 17. from the bottom. For "others appears," read "others appear."
col. 2. l. 15. For "Brteagne," read "Bretagne."
- Vol. XIV. p. 118. col. 2. to l. 7. from the end, add, "For if the semicircle described on the diameter BN, which corresponds to the whole arch AN, be divided into an indefinite number of equal arches Gg, &c. the sum of all the lines NF will be equal to as many times NK as there are arches in the same circle equal to Gg."
p. 119. col. 1. l. 15. For "corrapody," read "corresponding."
p. 137. at the end of the article "PENTLAND," dele "See PICTLAND."

DIRECTIONS FOR PLACING THE PLATES OF VOL. XIV.

PART I.			Plate CCCLXXXVI.	} to face	- Page 194	
Plate CCCLXXVIII.	} to face	- Page 15	CCCLXXXVII.			
CCCLXXIX.			CCCLXXXVIII.			250
CCCLXXX.			CCCLXXXIX.			256
CCCLXXXI.						
CCCLXXXII.		122				
CCCLXXXIII.		134				
CCCLXXXIV.		136				
CCCLXXXV.		194				
PART II.			CCCXC.		538	
			CCCXCI.		679	
			CCCXCII.		768	
			CCCXCIII.			

Cause of Refraction. very different from the similar points of the curve expressing the action of a single particle. These last are in the very places where the light sustains the greatest repulsive action of the whole row of particles. In the same manner may a curve be constructed, whose ordinates express the united action of the whole medium.

From these observations we learn in general, that a particle of light within the space of action is acted on with equal forces, and in the same direction, when at equal distances on each side of the surface of the medium.

Of the focal distance of rays refracted by passing out of one medium into another of different density and through a plane surface.

Lemma. The indefinitely small variation of the angle of incidence is to the simultaneous variation of the angle of refraction as the tangent of incidence is to the tangent of refraction; or, the contemporaneous variations of the angles of incidence and refraction are proportional to the tangents of these angles.

Plate CCCLIV. 140 Laws of refraction in plane surfaces. Let RVF, rVf (fig. 10.) be the progress of the rays refracted at V (the angle rVR being considered in its nascent or evanescent state), and VC perpendicular to the refracting surface VA. From C draw CD, CB perpendicular to the incident and refracted rays RV, VF, cutting rV, Vf in δ and β , and let Cd, Cb be perpendicular to rV, Vf.

Because the sines of incidence and refraction are in a constant ratio, their simultaneous variations are in the same constant ratio. Now the angle RVr is to the angle FVf in the ratio of $\frac{B\beta}{BV}$ to $\frac{D\delta}{DV}$; that is, of $\frac{BC}{BV}$ to $\frac{DC}{DV}$; that is, of $\frac{\sin. incid.}{\cos. incid.}$ to $\frac{\sin. refr.}{\cos. refr.}$; that is, of $\tan. incid.$ to $\tan. refr.$

Corollary. The difference of these variations is to the greatest or least of them as the difference of the tangents to the greatest or least tangent.

PROBLEM.

Plate CCCLV. Let two rays RV, RP diverge from, or converge to, a point R (figs. 1, 2, 3, 4.), and pass through the plane surface PV separating two refracting mediums AB, of which let B be the most refracting, and let RV be perpendicular to the surface. It is required to determine the point of dispersion or convergence, F, of the refracted rays VD, PE.

Make VR to VG as the sine of refraction to the sine of incidence, and draw GIK parallel to the surface, cutting the incident ray in I. About the centre P, with the radius PI, describe an arch of a circle IF, cutting VR in F; draw PE tending from or towards F. We say PE is the refracted ray, and F the point of dispersion or convergence of the rays RV, RP, or the conjugate focus to R.

For since GI and PV are parallel and PF equal to

PI, we have PF : PR = PI : PR = VG : VR = $\sin. incid. : \sin. refr.$ But PF : PR = $\sin. PRV : \sin. PFV$, and RRV is equal to the angle of incidence at P; therefore PFV is the corresponding angle of refraction, FPE is the refracted ray, and F the conjugate focus to R.

Corol. 1. If diverging or converging rays fall on the surface of a more refracting medium, they will diverge or converge less after refraction, F being farther from the surface than R. The contrary must happen when the diverging or converging rays fall on the surface of a less refracting medium, because, in this case, F is nearer to the surface than R.

Corol. 2. Let Rp be another ray, more oblique than RP, the refracting point p being farther from V, and let spe be the refracted ray, determined by the same construction. Because the arches FI, fi, are perpendicular to their radii, it is evident that they will converge to some point within the angle RIK, and therefore will not cross each other between F and I: therefore Rf will be greater than RF, as RF is greater than RG, for similar reasons. Hence it follows, that all the rays which tended from or towards R, and were incident on the whole of Vpp, will not diverge from or converge to F, but will be diffused over the line GFf. This diffusion is called aberration from the focus, and is so much greater as the rays are more oblique. No rays flowing from or towards R will have point of concurrence with RV nearer to R than F is: But if the obliquity be inconsiderable, so that the ratio of RP to FP does not differ sensibly from that of RV to FV, the point of concurrence will not be sensibly removed from G. G is therefore usually called the *conjugate focus* to R. It is the conjugate focus of an indefinitely slender pencil of rays falling perpendicularly on the surface. The conjugate focus of an oblique pencil, or even of two oblique rays, whose dispersion on the surface is considerable, is of more difficult investigation. See *Gravesande's Natural Philosophy* for a very neat and elementary determination (E).

In a work of this kind, it is enough to have pointed out, in an easy and familiar manner, the nature of optical aberration. But as this is the chief cause of the imperfection of optical instruments, and as the only method of removing this imperfection is to diminish this aberration, or correct it by a subsequent aberration in the opposite direction, we shall here give a fundamental and very simple proposition, which will (with obvious alterations) apply to all important cases. This is the determination of the focus of an infinitely slender pencil of oblique rays RP, Rp.

“Retaining the former construction for the ray PF, (fig. 1.) suppose the other ray Rp infinitely near to RP. Draw PS perpendicular to PV, and Rr perpendicular to RP, and make Pr : PS = VR : VF. On Pr describe the semicircle rRP, and on PS the semicircle SpP, cutting the refracted ray PF in s, draw pr, pS, ps.” It follows

(E) We refer to Gravesande, because we consider it as of importance to make such a work as ours serve as a general index to science and literature. At the same time we take the liberty to observe, that the focus in question is virtually determined by the construction which we have given: for the points P, F of the line PF are determined, and therefore its position is also determined. The same is true of the position of ps, and therefore the intersection s of the two lines is likewise determined.

Refraction
by Spherical
Surfaces.

follows from the lemma, that if ϕ be the focus of refracted rays, the variation $P\phi$ of the angle of refraction is to the corresponding variation $PR\phi$ of the angle of incidence as the tangent of the angle of refraction VFP to the tangent of the angle of incidence VRP . Now $P\phi$ may be considered as coinciding with the arch of the semicircles. Therefore the angles $PR\phi$, $Pr\phi$ are equal, as also the angles $P\phi$, $PS\phi$. But $PS\phi$ is to $Pr\phi$ as Pr to PS ; that is, as VR to VF ; that is, as the cotangent of the angle of incidence to the cotangent of the angle of refraction; that is, as the tangent of the angle of refraction to the tangent of the angle of incidence. Therefore the point ϕ is the focus.

Of Refraction by Spherical Surfaces.

General PROBLEM.

To find the focus of refracted rays, the focus of incident rays being given.

Plate
CCCLV.

Let $PV\pi$ (figs. 5, 6, 7, 8, 9, 10, 11, 12, 13, 14.) be a spherical surface whose centre is C , and let the incident light diverge from or converge to R .

Solution. Draw the ray RC through the centre, cutting the surface in the point V , which we shall denominate the *vertex*, while RC is called the *axis*. This ray passes on without refraction, because it coincides with the perpendicular to the surface. Let RP be another incident ray, which is refracted at P , draw the radius PC . In RP make RE to RP as the sine of incidence m to the sine of refraction n ; and about the centre R , with the distance RE , describe the circle EK , cutting PC in K ; draw RK and PF parallel to it, cutting the axis in F . PF is the refracted ray, and F is the focus.

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The focus
of rays re-
fracted by
spherical
surfaces
ascertained.

For the triangles PCF , KCR are similar, and the angles at P and K are equal. Also RK is equal to RE , and RPD is the angle of incidence. Now $m:n = RK:RP = \sin DPR : \sin RKP = \sin DPR : \sin CPF$. Therefore CPF is the angle of refraction corresponding to the angle of incidence RPD , and PF is the refracted ray, and F the focus. Q. E. D.

Cor. 1. $CK:CP = CR:CF$, and $CF = \frac{CP \times CR}{CK}$

Now $CP \times CR$ is a constant quantity; and therefore CF is reciprocally as CK , which evidently varies with a variation of the arch VP . Hence it follows, that all the rays flowing from R are not collected at the conjugate focus F . The ultimate situation of the point F , as the point P gradually approaches to, and at last coincides with, V , is called the *conjugate focus of central rays*, and the distance between this focus and the focus of a lateral ray is called the *aberration* of that ray, arising from the spherical figure.

There are, however, two situations of the point R such, that all the rays which flow from it are made to diverge from one point. One of those is C (fig. 5.), because they all pass thro' without refraction, and therefore still diverge from C ; the other is when rays in the rare medium with a convex surface flow from a point R , so situated beyond the centre that CV is to CR as the sine of incidence in the rare medium is to the sine of refraction in the denser, or when rays in the rare medium fall on the convex surface of the denser, converging to F , so situated that $CF:CV =$

$m:n$. In this case they will all be dispersed from F , so situated that $CV:CF = n:m = CR:CV$ for sine RPC :sine $RKC = n:m = CR:CP =$ sine RPC :sine PRC . Therefore the angle PRC is equal to RKC , or to FPC (by construction of the problem), and the angle C is common to the triangles PRC , FPC ; they are therefore similar, and the angles PRC , FPC are equal, and $n:m = CP:CF = CK:CR = CR:CP$; therefore $CP:CK = CP^2:CR^2$; but CP and CR are constant quantities, and therefore CK is a constant quantity, and (by the corollary) CF is a constant quantity, and all the rays flowing from R are dispersed from F by refraction. In like manner rays converging to F will by refraction converge to R . This was first observed by Huygens.

2. If the incident ray $R'P$ (fig. 5.) is parallel to the axis RC , we have PO to CO as the sine of incidence to the sine of refraction. For the triangles $R'PK'$, PCO are similar, and $PO:CO = R'K':R'P = m:n$.

3. In this case, too, we have the focal distance of central parallel rays reckoned from the vertex $= \frac{m}{m-n} \times VC$. For since PO is ultimately VO , we have $m:n = VO:CO$, and $m-n:m = VO-CO:VO$, $= VC:VO$, and $VO = \frac{m}{m-n} \times VC$. This is called the principal focal distance, or focal distance of parallel rays. Also CO , the principal focal distance reckoned from the centre, $= \frac{n}{m-n} \times VC$.

N. B. When m is less than n , $m-n$ is a negative quantity.—Also observe, that in applying symbols to this computation of the focal distances, those lines are to be accounted positive which lie from their beginnings, that is, from the vertex, or the centre, or the radiant point, in the direction of the incident rays. Thus when rays diverge from R on the convex surface of a medium, VR is accounted negative and VC positive. If the light passes out of air into glass, m is greater than n ; but if it passes out of glass into air, m is less than n . If, therefore, parallel rays fall on the convex surface of glass out of air, in which case $m:n = 3:2$ very nearly, we have for the principal focal distance $\frac{3}{3-2} VC$, or $+3VC$. But if it pass out of glass into the convex surface of air, we have $VO = \frac{2}{2-3} VC$, or $-2VC$; that is, the focus O will be in the same side of the surface with the incident light. In like manner, we shall have for these two cases $CO = +2VC$ and $-3VC$.

4. By construction we have $RK:RP = m:n$ by similarity of triangles $PF:RK = CF:CR$ therefore $PF:PR = mCF:nCR$ and $mPR \times CF = nCR \times PF$ therefore $mPR:nCR = PF:CF$ and $mPR-nCR:mPR = PF-CF:PF$ ultimately $mVR-nCR:mVR = VC:VF$

This is a very general optical theorem, and affords an easy method for computing the focal distance of refracted rays.

For this purpose let VR , the distance of the radiant point,

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Money.

to the money which purchases, and to the materials, tools, and maintenance, which are purchased with it; but only to one or other of those two values, and to the latter more properly than to the former.

"When paper is substituted in the room of gold and silver money, the quantity of the materials, tools, and maintenance, which the whole circulating capital can supply, may be increased by the whole value of gold and silver which used to be employed in purchasing them. The whole value of the great wheel of circulation and distribution is added to the goods which are circulated and distributed by means of it. The operation, in some measure, resembles that of the undertaker of some great work, who, in consequence of some improvement in mechanics, takes down his old machinery, and adds the difference between its price and that of the new to his circulating capital, to the fund from which he furnishes materials and wages to his workmen.

"What the proportion is which the circulating money of any country bears to the whole value of the annual produce circulated by means of it, it is perhaps impossible to determine. It has been computed by different authors at a fifth, at a tenth, at a twentieth, and at a thirtieth part of that value. But how small soever the proportion which the circulating money may bear to the whole value of the annual produce, as but a part, and frequently but a small part, of that produce, is ever destined for the maintenance of industry, it must always bear a very considerable proportion to that part. When, therefore, by the substitution of paper, the gold and silver necessary for circulation is reduced to perhaps a fifth part of the former quantity, if the value of only the greater part of the other four-fifths be added to the funds which are destined for the maintenance of industry, it must make a very considerable addition to the quantity of that industry, and consequently to the value of the annual produce of land and labour.

"That part of his capital which a dealer is obliged to keep by him unemployed, for answering occasional demands, is so much dead stock, producing nothing either to him or to his country. The judicious operations of banking enable him to make it active and productive. The gold and silver money which circulates in any country, and by means of which the produce of its land and labour is annually circulated and distributed to the proper consumers, is, in the same manner as the ready money of the dealer, all dead stock. It is a very valuable part of the capital of the country, which produces nothing to the country. The judicious operations of banking, by substituting paper in the room of a great part of it, enables the country to make a great part of this dead stock active and productive. The gold and silver money which circulates in any country, may very properly be compared to a highway, which, while it circulates and carries to market all the grass and corn of the country, produces itself not a single pile of either. The judicious operations of banking, by providing, if I may be allowed so violent a metaphor, a sort of waggon-way through the air, enable the country to convert, as it were, a great part of its highways into good pastures and corn-fields, and thereby to increase very considerably the annual produce of its land and labour. The commerce

and industry of the country, however, it must be acknowledged, though they may be somewhat augmented, cannot be altogether so secure, when they are thus, as it were, suspended upon the Dædalian wings of paper-money, as when they travel about upon the solid ground of gold and silver.

"The whole paper-money of every kind which can easily circulate in any country, never can exceed the value of the gold and silver, of which it supplies the place, or which (the commerce being supposed the same) would circulate there if there was no paper-money. If twenty-shilling notes, for example, are the lowest paper-money current in Scotland, the whole of that currency, which can easily circulate there, cannot exceed the sum of gold and silver which would be necessary for transacting the annual exchanges of twenty shillings value and upwards, usually transacted within that country. Should the circulating paper at any time exceed that sum, as the excess could neither be sent abroad, nor be employed in the circulation of the country, it must immediately return upon the banks to be exchanged for gold and silver. Many people would immediately perceive that they had more of this paper than was necessary for transacting their business at home, and as they could not send it abroad, they would immediately demand payment of it from the banks. When this superfluous paper was converted into gold and silver, they could easily find a use for it by sending it abroad; but they could find none while it remained in the shape of paper. There would immediately, therefore, be a run upon the banks to the whole extent of this superfluous paper, and if they showed any difficulty or backwardness in payment, to a much greater extent; the alarm which this would occasion necessarily increasing the run." See BANK and TRADE.

PAPER Office, an office in the palace of Whitehall, in which all the public writings, matters of state and council, proclamations, letters, intelligences, negotiations abroad, and generally all dispatches that pass through the offices of the secretaries of state, are lodged, by way of library.

PAPIER MACHE. This is a substance made of cuttings of white or brown paper, boiled in water, and beaten in a mortar, till they are reduced into a kind of paste, and then boiled with a solution of gum arabic or of size, to give tenacity to the paste, which is afterwards formed into different toys, &c. by pressing it into oiled moulds. When dry, it is done over with a mixture of size and lamp black, and afterwards varnished. The black varnish for these toys, according to Dr Lewis, is prepared as follows: Some colophony, or turpentine boiled down till it becomes black and friable, is melted in a glazed earthen vessel, and thrice as much amber in fine powder sprinkled in by degrees, with the addition of a little spirit or oil of turpentine now and then: when the amber is melted, sprinkle in the same quantity of sarcocolla, continuing to stir them, and to add more spirit of turpentine, till the whole becomes fluid; then strain out the clear through a coarse hair-bag, pressing it gently between hot boards. This varnish, mixed with ivory-black in fine powder, is applied, in a hot room, on the dried paper-paste; which is then set in a gently heated oven, next day in a hotter oven, and the third day in

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Money
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Papier.

Paplagonia,
Paphos.

a very hot one, and let stand each time till the oven grows cold. The paste thus varnished is hard, durable, glossy, and bears liquors hot or cold.

PAPHLAGONIA (anc. geog.), a country of the Hither Asia, beginning at Parthenius, a river of Bithynia, on the west, and extending in length to the Halys eastward, with the Euxine to the north, and Galatia to the south. Pliny enlarges the limits on the west side to the river Billis, on this side the Parthenius. It is called *Pylæmenia* by some (Pliny). *Papblagones*, the people, mentioned by Homer, and therefore of no small antiquity. A superstitious and silly people (Lucian); a brave people (Homer); taking their name from Phaleg (Bocchart).

PAPHOS (anc. geog.), two adjoining islands on the west side of the island of Cyprus; the one called *Hala Paphos* (Strabo, Ptolemy, Pliny); the other *Nea Paphos*; and when mentioned without an adjunct, this latter is always understood. Both dedicated to Venus, and left undistinguished by the poets (Virgil, Horace). Hence Venus is surnamed *Paphia*, *Paphii*, the people, (Coins, Stephanus). It was restored by Augustus, after a shock of an earthquake, and called *Augusta* (Dio).

The Abbé Mariti, in his Travels through Cyprus, gives the following account of the island of Paphos. "It is situated (says he) on the southern side: it contained the celebrated temple of Venus; which, together with the city, was destroyed by an earthquake, so that the least vestige of it is not now to be seen. A lake in the neighbourhood, which even in summer overflows with stagnant and corrupted water, renders the air in some degree unwholesome. On the western coast is the new Paphos, called by some of the modern geographers *Baffos*; a name which is unknown in the island of Cyprus. That we may not positively ascribe to the latter every thing that history tells us of Paphos in general, it may not be here improper to mention that it has been several times destroyed. This city had a port, where vessels trading upon that coast still cast anchor: but this happens only in summer; for, being exposed to every wind, it is extremely dangerous. The bottom of it is full of sharp rocks; which sometimes destroy the cables so much, that mariners are obliged to keep them afloat on the surface of the water, by means of empty casks fixed to them at certain distances. In the neighbourhood there are two castles; one on the borders of the sea, and the other on the summit of a little hill: but the latter is at present in ruins. The government of Paphos consists of a digdaban or commissary; a cadi; and an aga, who presides over the customhouse. Of all the Christian edifices, there is none remaining but the church of St George, in which service is performed by the Greek ministers. The productions of this part of the island, which are all of an excellent quality, are silk, barley, and other kinds of grain. To discover the origin of the old and new Paphos, would be carrying light into the midst of the thickest darkness. When we have added conjecture to conjecture, we are still in the same situation. As this is an attempt superior to my abilities, I shall leave it to the divining, though uncertain, knowledge of our antiquaries. I must, however, observe, that there was here formerly a temple dedicated to Venus, which was entirely destroyed by an

earthquake. In this island St Paul by his eloquence converted Sergius, a Roman proconsul. He here likewise conferred the deaconship on his disciple and colleague Titus, who soon after suffered martyrdom. Paphos was an episcopal city in the time of the Lusignans; and it is still the seat of a bishop, who is a suffragan to the archbishop of Nicosia. On the western side of the island there are a great number of scattered villages; but they are not worthy of notice, being either abandoned or in ruins."

Mr Bruce informs us, that in the neighbourhood of this place many silver medals of excellent workmanship are dug up; they are, however, but of little estimation among the antiquarians, being chiefly of towns of the size of those found at Crete and Rhodes, and in all the islands of the Archipelago. There are some excellent Greek Intaglios; generally upon better stones than usual in the islands. This illustrious traveller informs us, that he has seen some heads of Jupiter, remarkable for bushy hair and a beard, which were of excellent workmanship, and worthy of any price. All the inhabitants of the island are subject to fevers, but especially those in the neighbourhood of Paphos. The same traveller observes, that Cyprus was very long undiscovered; for though ships had been sailing on the Mediterranean 1700 years before Christ, and though the island is only a day's sailing from the continent of Asia on the north and east, and little more from that of Africa on the south, it was not known at the building of Tyre, a little before the Trojan war, that is, 500 years after the neighbouring seas had been navigated. It was covered with wood at its first discovery; and our author is of opinion, that it was not well known even at the time of building of Solomon's temple; because we do not find that Hiram king of Tyre, though just in its neighbourhood, ever had recourse to it for wood: though the carriage would undoubtedly have been easier from thence, than to have brought it down from the top of Mount Lebanon. Eratosthenes informs us, that in ancient times the island was so overgrown with wood, that it could not be tilled; so that they first cut down the timber to be used in the furnaces for melting silver and copper; that after this they built fleets with it: but finding even this insufficient, they gave liberty to all strangers to cut it down for whatever purpose they pleased; and not only so, but they gave them afterwards the property of the ground they had cleared. Matters are now quite altered; and the want of wood is a principal complaint in most parts of the island. About Acamas, however, on the west side of the island, the wood is still thick and impervious, inhabited by large stags and wild boars of a monstrous size. Mr Bruce was informed, that a live elephant had lately been seen there, but gave no credit to the account.

PAPIAS, bishop of Hieropolis, a city of Phrygia, was the disciple of St John the Evangelist, and the companion of Polycarp, as St Jerome observes, and not of John the Ancient, as some other authors have maintained. He composed a work in five books, intitled *Expositions of the Discourses of our Lord*, of which there are only some fragments now remaining. He it was who introduced the opinion of the Millennarians.

PAPILIO, the BUTTERFLY, in zoology; a genus of insects belonging to the order of lepidoptera. It has

Paphos
Papilio.

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